

**ROYAL AIR FORCE**

**HISTORICAL SOCIETY**



**JOURNAL**

The opinions expressed in this publication are those of the contributors concerned and are not necessarily those held by the Royal Air Force Historical Society.

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## CONTENTS

AIRFIELD CONSTRUCTION BY THE ROYAL AIR FORCE, 1939 TO 1966 by AVM John Browne	8
5357 FIELD FORCE WING by John Marsh	17
SHIELD FORCE: 5358 WING AND THE LIBERATION OF HONG KONG by Brian Corbett (presented by Wg Cdr Dick Turpin.	32
COLD WAR – WARM CLIMES, by Sqn Ldr John Fox	46
MORNING DISCUSSION PERIOD	72
RAF REGIMENT ANTI-AIRCRAFT (AA) DEFENCE, WW II TO BELIZE by Air Cdre Mickey Witherow	78
THE RAF SERVICING COMMANDOS, 1942-46 by Wg Cdr Tim Newstead	96
ROYAL AIR FORCE REPAIR AND SALVAGE, 1939-1945 by AVM Peter Dye	111
MOBILE FIELD PHOTOGRAPHIC UNITS. Jointly drafted by Gp Capt Geoffrey Oxlee and Wg Cdr Mike Mockford (presented by the latter)	124
AFTERNOON DISCUSSION PERIOD	136
AN OVERVIEW OF AIRFIELD CONSTRUCTION PRIOR TO AND DURING WW II by Sebastian Cox	142
BOOK REVIEWS	154



## SELECTED ABBREVIATIONS

AAA	Anti-Aircraft Artillery
ACB	Airfield Construction Branch
ACS	Airfield Construction Service
ADIZ	Air Defence Identification Zone
ACGRE	Airfield Construction Groups, Royal Engineers
AFOR	(NATO) Albania Force
ALG	Advanced Landing Ground
AMSO	Air Member for Supply and Organisation
AMWD	Air Ministry Works Department
AOA	Air Officer Administration
AP	Air Publication
AP	Armour Piercing
CRO	Civilian Repair Organisation
ENSA	Entertainments National Service Association
EOD	Explosive Ordnance Disposal
EOKA	<i>Ethniki Organosis Kyprion Agoniston</i> (National Organisation of Cypriot Fighters)
FEAF	Far East Air Force
Form 540	The Operations Record Book of an RAF unit
GOC	General Officer Commanding
HE	High Explosive
LMG	Light Machine Gun
MAMS	Mobile Air Movements Squadron
MAP	Ministry of Aircraft Production
M&E	Mechanical and Electrical
NATS	National Air Traffic Services
PAC	Parachute and Cable
PBS	Prefabricated Bituminous Surfacing
POL	Petrol, Oil and Lubricants
PSP	Pierced Steel Plank
PSV	<i>Philips Sport Vereniging</i> (Philips Sports Union)
RE	Royal Engineers
REME	Royal Electrical and Mechanical Engineers
RSU	Repair and Salvage Unit
SACEUR	Supreme Allied Commander Europe
SEAC	South East Asia Command
SFOR	(NATO) Stabilisation Force (in Bosnia)
SMT	Square Mesh Track
TSW	Tactical Supply Wing
WNr	<i>die Werknummer</i> – works (or constructor's) number

## **SUPPORT OF AIR OPERATIONS**

**RAF MUSEUM, HENDON, 20 APRIL 2011**

### **WELCOME ADDRESS BY THE SOCIETY'S CHAIRMAN**

**Air Vice-Marshal Nigel Baldwin CB CBE**

Ladies and gentlemen – good morning. Before I say something about today's seminar, let me express my usual thanks to Air Vice-Marshal Peter Dye and his colleagues here at the RAF Museum for allowing us to use these splendid facilities. We get so much co-operation and help from them all that we cannot thank them enough.

We got the idea for this seminar a few years ago from Air Vice-Marshal John Browne who has, for over 20 years, been the President of the RAF Airfield Construction Officers' Association. He convinced us that a day dedicated to some aspects of the vital ground support of RAF air operations throughout our history would not come amiss for the Society so today's emphasis will be slightly different from the usual.

To guide us through the day, I have asked one of the Service's most distinguished engineers – Sir Michael Alcock – to take on the task. Sir Michael's earlier career concentrated on the V-bomber force and the Phantom before he began to climb the ranks taking on increasing training, engineering and logistical responsibilities culminating in his becoming Air Officer Engineering and Supply at HQ Strike Command in 1988 when he was later responsible for the logistic support of all RAF forces involved in the 1992 Gulf War. After that, he became the RAF's Chief of Logistic Support and Chief Engineer before becoming the first ground branch officer in RAF history to achieve 4-star rank and be a member of the Air Force Board. In 1994 he became the first AOCinC of Logistics Command at RAF Brampton.

Of all his many post-RAF retirement activities, which include being a trustee and council member of the RAF Benevolent Fund, he has been a Specialist Adviser to the House of Commons Defence Committee and is also President of the British Model Flyers Association.

He will have no difficulty keeping today's speakers under control. So, Sir Michael, over to you.

## **OPENING REMARKS BY SEMINAR CHAIRMAN**

### **Air Chief Marshal Sir Michael Alcock GCB KBE DSc FEng FIMechE FRAeS**

I feel deeply honoured to have been asked to Chair this day. You have already heard a little about my carer. I spent 37 years progressing from a National Servicemen to the Air Force Board and all of that was in ‘support’ apart from a couple of training appointments. So, I guess that I am almost tailor made to do the job that Nigel has invited me to do. One thing that I would take slight issue with is the title that was chosen for the day, which is ‘Ground Support of Air Operations’. Why ‘ground’. Why not simply ‘Support of Air Operations’ – by the ground branches?<sup>1</sup> I don’t like that connotation of ‘ground’ – we are all basically airmen – it’s just that some of us have different roles to play in the way that the business is conducted.

I suspect that we may be going to hear a few untold stories today, especially this morning, about the Airfield Construction Branch. I have always had a high regard for them because, while we all tend to focus on the aeroplanes and the technology, what we fly *from* is actually pretty important too. The only brush I ever had with them personally was when we built our airfield at Mount Pleasant in the Falklands. I just happened to be the luckless chap looking after the relevant Vote at the Ministry. It was fascinating to see how the engineering task was handled by industry – many of the personalities involved being former members of the Airfield Construction Branch. So – the morning is being given over to airfield construction and there is no one better qualified to lead on that than Air Vice-Marshal John Browne.

<sup>1</sup> Duly noted. See heading on previous page. **Ed**

## AIRFIELD CONSTRUCTION BY THE ROYAL AIR FORCE, 1939 TO 1966

### AVM John Browne



*Having qualified as a civil engineer at Southampton University, John Browne joined the ACB in 1958 and served with it in the UK, Cyprus, Libya and the Seychelles until 1966 when he transferred to the Engineer Branch. After working on aircraft related appointments at home and in Germany he spent 1982-89 with MOD(PE). His final tour was as Director General Communications, Information Systems and Organisation.*

*Following retirement from the RAF in 1992 he spent four years with NATS and became, and still is, President of the RAF Airfield Construction Officers' Association*

### Introduction

Two Associations, the Royal Air Force Airfield Construction Officers' Association (ACOA) and the Airfield Construction Branch Association (ACBA), maintain the comradeship that developed between those of us who served in the airfield construction units of the Royal Air Force. Our recruiting base stopped growing when the last of these units were disbanded in 1966, so you should not look for youth amongst us, although the ACBA still has 321 members and the ACOA about 135, and this is where today's presentation team comes from. It is also where the words and the research that underpins them came from, but just as W S Gilbert's words would be lost without Arthur Sullivan's music, our words would be a bland diet without the garnish of maps and photographs that have been so generously provided by a number of our friends.

I have people to thank for what you are about to receive, therefore, and in no particular order, as they say, I am most grateful to the Society for giving us this opportunity to tell our story; to Peter Donaldson and John Marsh for the many hours they spent deciphering Forms 540 and other documents at the National Archives; to John Marsh again for presenting the 5357 Wing story; to Dr Malcolm Llewellyn-Jones for identifying productive areas for research on 5358

Wing; to the late Squadron Leader Cedric Rosenvinge for his detailed first hand account of the 5358 Wing story; to Brian Corbett for his work on the history of 5358 Wing; to Dick Turpin for stepping in to present the story when Brian could not be here; to John Fox for his willing support in all things and for taking on the job of producing and presenting the post-war story of RAF airfield construction; to Wing Commander Ray Pixley for being a most helpful primary source for the Berlin Airlift; and to Brian King for putting the maps and pictures together and driving the laptop so that our presenters will not have to multi-task (which is inadvisable at our age); to Nick Botham for producing the essential image of Wing Commander Alex Dow from the small photograph in his obituary in the *Daily Telegraph*; to Seb Cox and Lee Barton of the Air Historical Branch for their ready support and for finding photographs that add pictures to the words about the black and white war that was World War II; and finally I have to thank Graham Douglas; Graham's father, Flight Lieutenant Rod Douglas, served on 5001 Squadron in Cyprus, El Adem and Aden in the late '50s, and Graham has produced the splendid maps for us which you may well remember long after you've forgotten the words that went with them.

## **THE FIRST SIX YEARS – WORLD WAR II**

So, how did this all start? Airfield construction for the Royal Air Force before the Second World War was the responsibility of the Air Ministry except in war zones where it was the responsibility of the Royal Engineers, and yet in 1944 some 30,000 RAF personnel were building, repairing and maintaining airfields all over the world. Well, it seems to have started with a suggestion by the Under Secretary of State at an Expansion Progress Meeting<sup>1</sup> on 20 June 1939 when he asked the Chief of the Air Staff to follow the 1914-18 War precedent and look into setting up a flying training school in France. When it was decided later that year to implement this idea, the French Government allocated sites for the airfields in the Loire Valley, but the Royal Engineers did not have the resources to build them because

<sup>1</sup> From June 1935 onwards, Air Council Meetings were known as Secretary of State's Progress Meetings on RAF Expansion Measures, Expansion Progress Meetings (EPM) for short.



*Alexander John 'Daddy' Dow,  
the father of the Branch.*

they were fully committed elsewhere. The typically pragmatic British solution was to declare that the Loire Valley was not a war zone, thus relieving the Royal Engineers of their responsibility for building airfields there and allowing the Air Ministry to do the job itself.

The Air Ministry formed an RAF Supervisory Unit to design and manage the construction of the airfields which would be done by local civilian contractors. Civil Engineers and Quantity Surveyors were selected from the Air Ministry's civilian staff and commissioned into the Royal Air Force Volunteer Reserve after a three-week officers' course, and a number of Clerks of Work, Station Engineers and

Draftsmen were given NCO ranks.

The man selected to lead the unit was to be the inspiration and driving force behind the airfield construction organisation that supported the Royal Air Force throughout the Second World War. Alexander John Dow, widely known as 'Daddy' Dow, was a 34-year old Scottish civil engineer who had worked for a firm of consulting engineers in Aberdeen, built roads through the Malayan jungle for the Public Works Department and studied reinforced concrete design at Purdue University in Indiana before joining the Air Ministry. He was commissioned as a pilot officer in February 1940 but was a wing commander by the time he led No 1 Works Area (France) to the Loire Valley in March. Despite a lack of cooperation from the Army, general supply and resource problems, and difficulties in negotiating with French and Belgian contractors when they had only one interpreter, three grass airfields had been completed and more were in work when Germany launched its *Blitzkrieg* on 10 May 1940.

As the military situation deteriorated the unit was ordered to withdraw to St Nazaire, and it was evacuated on the 16 June 1940.

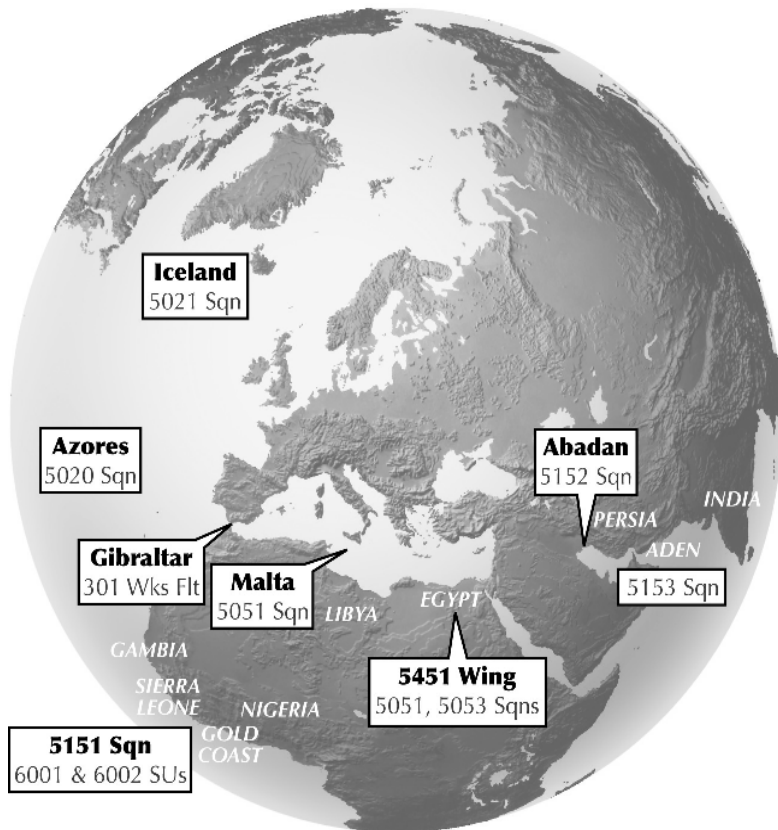
The Air Ministry decided to keep the unit together as it had done well under difficult circumstances and gave it the task of selecting sites for emergency airfields in the south of England. It was subsequently renamed No 1 Works Area (Field) and charged with supervising the construction of a number of permanent airfields, mainly in the west and south-west.

Royal Engineer detachments and RAF station personnel kept the squadrons flying by repairing the heavy damage suffered by Fighter Command's airfields in the summer of 1940. In the spring of 1941, however, the Army withdrew their troops to train for future Army commitments, so the Air Ministry formed the Royal Air Force Works Service around the nucleus of No 1 Works Area (Field). Personnel were drawn from serving airmen in the wider Royal Air Force with building and construction industry skills and from suitable recruits from civilian life. From this pool of manpower, Works Flights were formed with a combination of experienced tradesmen and unskilled labour. Flights were based on important operational stations for the rapid repair of bomb damage, but when not engaged on that they would undertake general work on the station for the Air Ministry Works Department (AMWD). Works Squadrons, each controlling ten Works Flights, were located on stations close to AMWD Works Area Headquarters so that they could draw on AMWD's resources easily if necessary, and the formation and development of the whole Works Service was vested in a small branch at the Air Ministry headed by Wing Commander Dow.

By the end of 1941, eight works squadrons had been formed, the majority of them in the south of England and East Anglia which covered most of Fighter and Bomber Commands' operational stations. Daddy Dow's branch at the Air Ministry had also assumed responsibility for the administration and welfare of airmen running power houses at radar stations and other remote installations around the British Isles by forming the first of the Service's Mechanical and Electrical, or M&E, Flights.

As German raids reduced in 1942 and the RAF went onto the offensive, the primary task of the Works Service's engineering units changed from the rapid repair of bomb damage to building the longer and heavier runways and new airfields required by an expanding Royal Air Force and the United States 8th and 9th Army Air Forces.

## Overseas RAF Works Service Units



### *Wartime global deployment of Airfield Construction units.*

New types of civil engineering plant had been developed for this sort of work, mainly in America, and the Works Service was beginning to receive some of these machines. As their efficient and effective use was becoming a specialised business, a Plant Depot was established at Mill Green, near St Albans, to manage, issue and support the increasing amount and variety of plant. A school to train operators was formed nearby, and Plant Squadrons manned by specialist Plant Officers and trained and experienced operators were introduced to make the best use of the new civil engineering machinery.

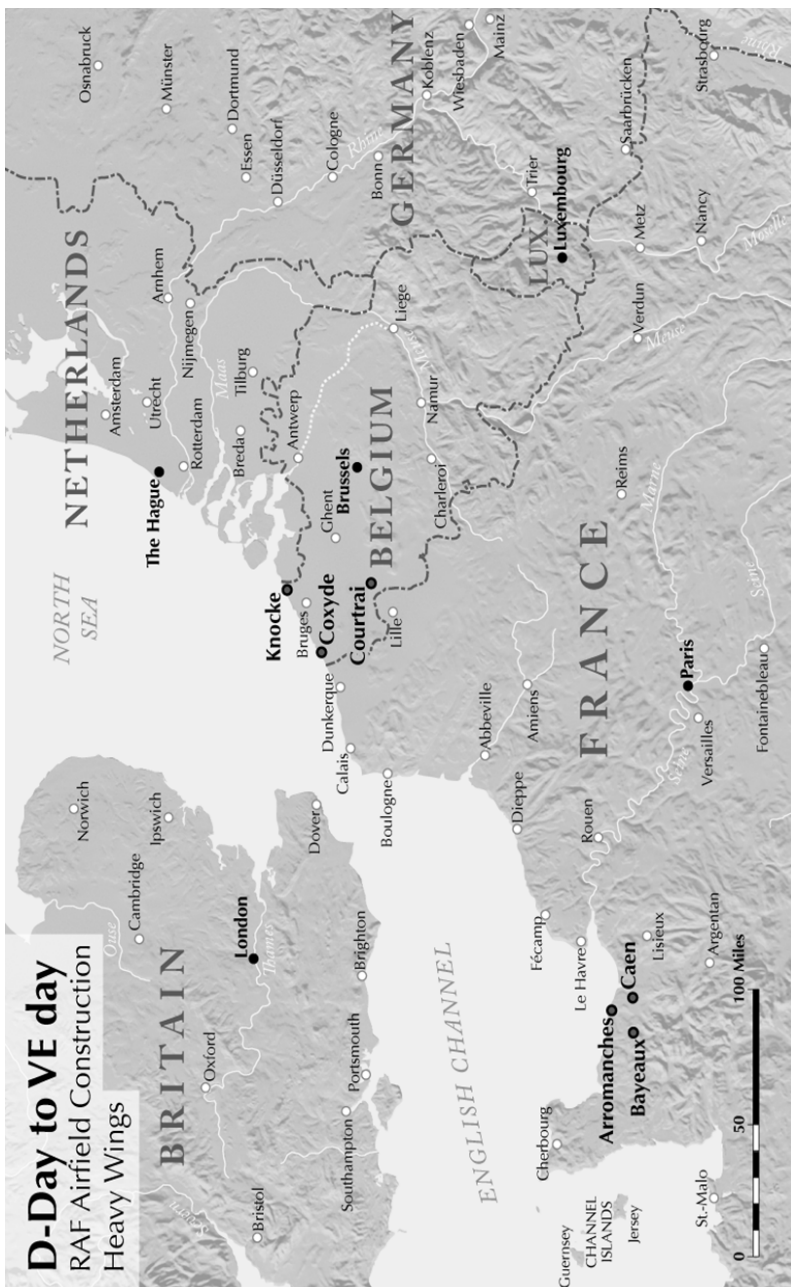
RAF Works Service units were not only in demand at home, they



were also needed overseas. No 5451 Wg Headquarters and its two subordinate units, Nos 5051 and 5053 Sqns, moved to Egypt in 1942. No 5051 Sqn then moved to Malta and spent most of 1943 preparing the island's airfields for their role in the invasion of Sicily. No 5021 Sqn arrived in Iceland in May 1942 to maintain the two airfields and signals units supporting transatlantic traffic and Coastal Command squadrons; further south, 5020 Squadron sailed to the Azores in February 1944 to develop and maintain an airfield there for the same purpose. In June 1942, 301 Works Flight arrived in Gibraltar to improve RAF accommodation and build a 3,300 feet extension to the runway. No 5152 M&E Sqn was established in early 1942 to support the construction of a large extension to the Anglo-Iranian Oil Company's refinery at Abadan in Persia by providing skilled personnel to install pipe-work, tankage and ancillary apparatus, and in addition to 5153 M&E Squadron's commitments in Egypt and Libya, its detachments in Aden and on airfields in Iraq maintained essential installations on the trunk routes to India and the Far East. And finally, in West Africa Nos 6001 and 6002 Works Supervisory Units, together with 5151 M&E Squadron helped the Public Works Department to construct or extend a number of temporary and permanent runways and erect airfield buildings and signals units for the RAF in The Gambia, Sierra Leone, Nigeria and the Gold Coast.

The direct control of all units from the Air Ministry became impractical as the RAF Works Service continued to grow, and Works Wing Headquarters were formed in 1943 to decentralise the organisation. Each wing controlled three works squadrons and one plant squadron, and in June 1943 the corporate title was changed to the, by then more appropriate, Royal Air Force Airfield Construction Service – the ACS.

A major task in 1943 was the construction of some of the twenty-three Advanced Landing Grounds (ALG) in Kent, Sussex and Hampshire from which the RAF and USAAF fighter and fighter bomber squadrons would be able to operate most effectively over northern France and the D-Day beachhead. The main requirements of each ALG were two metal tracked runways, one 4,800 feet long, the other 4,200 feet, together with 2½ miles of perimeter track, an MT track, hangars, POL installations and bomb dumps. There were few permanent buildings so, accommodated largely under canvas, each



ALG was built by a team of three officers and 200 airmen in three months, despite being regularly harassed by the *Luftwaffe* in the course of their work.

Group Captain Dow, as he became about this time, had known for some time that the ACS would have to play a big part in operations on the Continent after the invasion, if only because the overall shortage of manpower for the task would demand it. But he also knew that the Army would probably not acknowledge – or perhaps even realise – until late in the day that it did not have enough manpower for all the engineering tasks it was responsible for in a theatre of war, which included airfield construction. The ACS could not, however, expect to receive a policy directive authorising it to commit resources to preparing for a role on the Continent until the Army called for ACS reinforcements. Dow also concluded that the ACS's role would require two types of unit: a relatively lightly equipped and highly mobile Field Wing capable of rapid, temporary construction in forward areas where enemy forces might still be encountered, and a Heavy Wing, not so mobile but scaled with larger quantities of heavier plant and able to undertake larger and more permanent tasks behind the forward area.

Creating a Field Wing capable of looking after itself in the front line as a private venture without official sanction or resources presented a problem. The solution was for each ACS squadron to concentrate those of their men with the right medical category and appropriate mental and physical qualities into one of their flights, and for the ACS to beg, borrow or barter the means to give all these Field Flights, as they were called, the military and physical fitness training they required without the wider Royal Air Force commenting on any drop in productivity. The official call for the ACS to contribute to Operation OVERLORD came in early 1944, and 5357 Field Force Wing was officially formed at the end of February with two squadrons, Nos 5022 and 5023 Sqns, each with six field flights, a field plant flight and workshop and MT flights. Each squadron had a total of fifteen officers and about 600 warrant officers, NCOs and airmen. This wing, together with four heavy wings, Nos 5352 to 5355 inclusive, made up about two thirds of the 16,300 Royal Engineer and Royal Air Force airfield construction personnel ultimately involved on the Continent.

The heavy wings worked on a large number of military engineering tasks when they arrived in France. No 5352 Wg's contribution to the Bayeux by-pass, for example, included the construction of a reinforced concrete bridge. A little later, when the Allied forces could not get through Caen, because it had been reduced to rubble, the CO of No 5353 Wg received orders, at 0200 hrs, to build a 2½ mile long by-pass capable of carrying 8,000 vehicles a day and he was given just twelve days in which to get it done. It was finished at 2100 hours on the eleventh day.

When the Allied advance was then held up in the Netherlands during the winter of 1944-45, the heavy wings were able to start bringing many badly damaged French and Belgian airfields back into use as permanent bases for heavy aircraft. The two runways at Coxyde had 320 craters between them, but with the help of some 800 civilians, one squadron rebuilt the runways and two miles of taxiway and laid new hardstandings for forty aircraft in just three months. Three runways were built on land at Knocke from which 12,000 mines had first to be removed, and 50,000 square yards of hardstanding and a runway were built for the aircraft repair depot at Courtrai by half a squadron supported by 2,000 civilians and 600 horses and carts.

All the wings were heavily committed from the minute they set foot on the Continent, and the amount of work increased after VE-Day when the Airfield Construction Service became responsible for all RAF Works Services on the Continent. But that is for later, and the story of the part 5357 Wing, the Field Force Wing, played in the battle for Europe is next.

#### Notes

Sources consulted for this section of the presentation included:

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## 5357 FIELD FORCE WING

### John Marsh



*John Marsh's connection with the RAF began as a cadet pilot at Liverpool UAS in 1951 and was followed by National Service with the ACB on secondment to AMWD as Assistant Resident Engineer at Lyneham, then undergoing a £2M building programme. In his subsequent career as a consulting engineer he was involved in the design and construction of roads and bridge and the geotechnical aspects of civil engineering projects in the UK and the Middle East. He is a member of the RAF Airfield Construction Officers' Association and was its Honorary Treasurer from 2004 to 2010.*

The records show that 5357 Wing and its two squadrons, Nos 5022 and 5023, were formed at RAF Mill Green, near St Albans; the wing on 25 February 1944, and the squadrons on 1 March. But as we heard earlier, the personnel had all been selected and trained together over the previous year, and on New Year's Day 1944 the Headquarters and six field flights of what was to become 5023 Squadron arrived at Pen Park, near Bristol, for a one-month course in battle drill and field engineering. The still un-numbered squadron was then moved to Kent in February where it was joined by its plant flight and tasked to build roads, buildings and anchorages for the balloon barrage being built across Kent against the anticipated V1 threat.

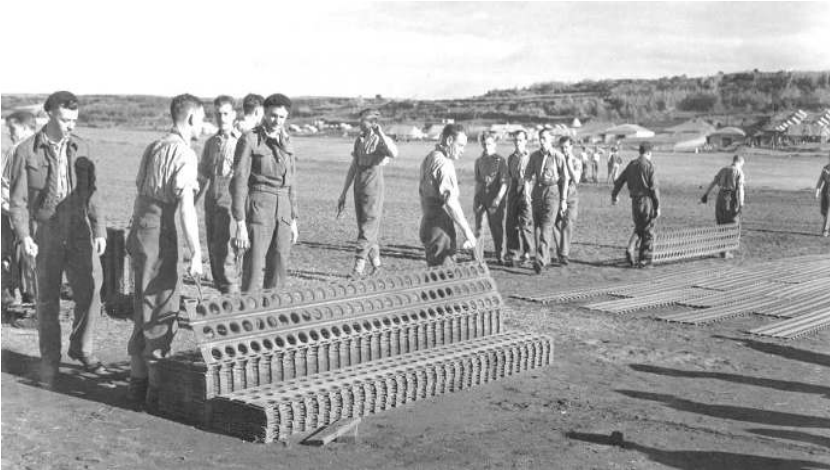
After officially forming at Mill Green, the whole wing moved to field locations to prepare for active service. 5023 Squadron joined 5357 Wing Headquarters in Ashurst Wood, near East Grinstead, and 5022 Squadron set up camp in Royal Common, Elstead, near Godalming. Advance parties planned the camps; the field plant flights prepared the ground; tents were pitched; uniforms changed from blue to khaki and a programme of field engineering and military engineering training, infantry and weapons training, fitness training, route marches and range work, technical lectures and anti-gas practice began. New plant, MT and equipment arrived; inventories of tools and equipment were brought up to scale; plant and MT was waterproofed,



*Square Mesh Track (SMT).*

inspected by the REME and Royal Engineers and further waterproofing added, and the use of three types of temporary airfield surfacing was practised.

The Square Mesh Track (SMT) weighed about 8½ pounds a square yard. It was delivered in rolls 7 feet 3 inches wide and 77 feet long; it was easy to lay, and it reduced the wear on grass and earth strips, particularly when they were wet. Pierced Steel Plank (PSP) was robust under prolonged use and easy to lay, but it weighed over 47 pounds a square yard, and as weight was at a premium when everything the



*Above – Pierced Steel Plank (PSP) and, below – Prefabricated Bituminous Surfacing (PBS)*



Allied forces needed still had to come over the beaches in Normandy, PSP was not used much on the Continent until December 1944 when the port of Antwerp was finally opened. Prefabricated Bituminous Surfacing (PBS) was ‘roofing felt on steroids’. It was the lightest of the three types, weighing about 7 pounds a square yard when laid in 40 inch wide strips on good load-bearing ground with a 20 inch overlap, the mating surfaces being painted with a mixture of petrol and diesel by a machine known as the ‘Stamplicker’ to stick the sheets

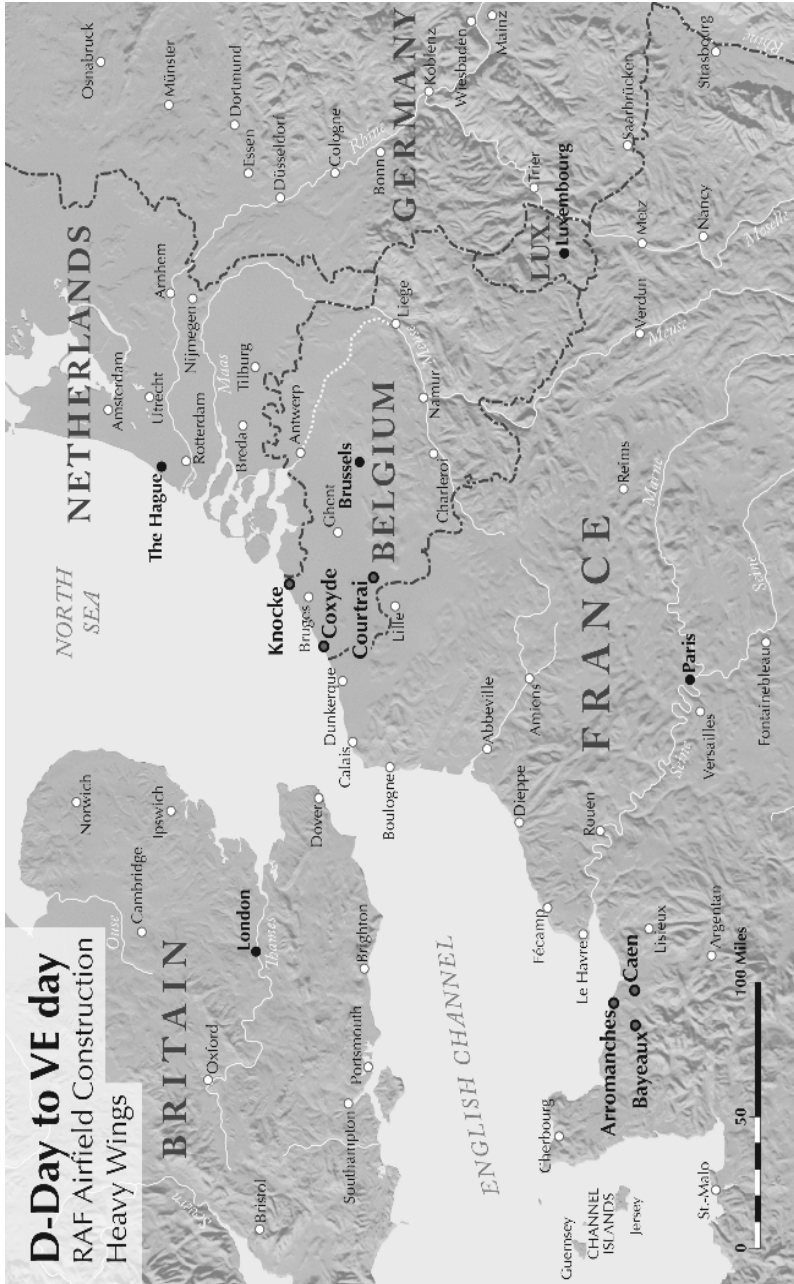
together. The finished surface worked well when wet and kept the dust down when the sun shone.

Major General Inglis, Chief Engineer, 21st Army Group, and his representative, Brigadier Panet, who lived at HQ 2nd Tactical Air Force, were responsible for the repair, maintenance and construction of airfields on the Continent, and their resources for these duties were five Airfield Construction Groups, Royal Engineers, or ACGREs, and the five Royal Air Force Airfield Construction Wings. When 5357 Wing Headquarters and 5023 Squadron landed at Arromanches on 6 July 1944 they were put under the command of 12 ACGRE and tasked with building roads, perimeter tracks and other essential airfield services on existing airstrips pending the arrival of the rest of the wing. The soil on these airfields was fine and it dried quickly, so the immediate problem was to lay the dust which hazarded flying and damaged the engines of aircraft, plant and MT. The Royal Engineers had sprayed water on the strips, but the soil dried too quickly for this to be effective. The wing salvaged bunker fuel from a beached destroyer and sprayed that instead to much better effect.

The last elements of 5022 Squadron landed in Normandy on 16 July, and the wing was finally complete. Throughout the campaign in Europe a reconnaissance team from the Wing Headquarters would move with the front line troops to survey captured airfields, select sites for landing strips and assess times to repair or build. Squadrons or flights would then be tasked with making sites usable as quickly as possible, and then effecting more permanent repairs on captured runways if time was available. More usually, permanent repairs were left for the heavy wings if the runways were needed in the long term.

On 20 July, a 5357 Wing Headquarters reconnaissance team surveyed a site for airstrip B19 near Lingèvres in Normandy, which had to be operationally complete by first light on 8 August. An advanced party from 5022 Squadron moved there on 31 July, and the rest of the wing and the plant arrived by 2 August. The site was on agricultural land, and corn was growing on it to a height of about a metre, so the airmen drove the horses and reapers to harvest the crop before starting to build the airstrip. The squadrons were regularly visited by the Press and officials, and their plant and MT detonated a number of explosions as they moved about the site, but there were no casualties and a 2,000 feet by 50 feet SMT runway with taxiways,







*Heavy plant being used to level an airstrip in Normandy.*

dispersals and an MT road had been laid by the end of 7 August.

5022 Squadron received orders in the early hours of 11 August to build an Auster strip near La Ferrière for General Montgomery. A detachment completed the task on the 13th in time for the Auster carrying General Montgomery and an American pilot to land. According to No 5022 Sqn's F540 for August 1944, the American thought he could land a Dakota on this strip, and he returned later that day to prove that he could.

The town of Condé-sur-Noireau in Normandy had been heavily bombed by the 8th Air Force, the streets were buried under rubble, and the Allied armour was unable to advance. 5357 Wing was put in support of XXX Corps and given the task on 17 August of clearing a way through the town. The roads were so deeply buried that it took the wing's reconnaissance party 2½ hours to find and mark them by following the stumps of telegraph poles and the occasional glimpse of a kerbstone. 5023 Squadron's bulldozers then took about 36 hours to clear enough of the roads for the armour to start moving through the town, following which both squadrons spent three days clearing more rubble to increase the flow of traffic. Lieutenant General Sir Brian Horrocks, GOC XXX Corps, was generous with his praise for the way the wing had conducted itself in Condé and emphasised that opening the roads and keeping the traffic moving on them had been crucial to the success of the advance in that sector.

With the Allied advance now well underway, the wing moved

forward to Gacé on 24 August to reconnoitre the airfield at B28, Evreux/Fauville, and the site for an airstrip at B30, Créton.

Evreux/Fauville was the wing's first German airfield. 5023 Squadron arrived there on the 26th and found a plaque on the airfield that the Germans had erected to commemorate the bombing of Coventry; the plaque was later presented to the City. The concrete runway was badly cratered, so a 1,200 yard grass strip was prepared in two days, but 2½ days of rain made that strip very soft, and the Spitfire IXs of Nos 401 and 412 Sqns left the surface badly rutted. The squadron was then told to repair the concrete runway, but such was the pace of the advance, that they were told the following evening to stand by to move on to B48, Amiens/Glisy.

Meanwhile, No 5022 Sqn had arrived at B30, Créton, on the 26th. They sent patrols into the nearby woods on arrival to evict German snipers and cleared the crops off the site before building a 1,300-yard strip on it. Group Captain Green landed the first of 124 Wing's Typhoons on the strip at 0830 hours on the 29th; the second made a less dignified arrival as he had not lowered his undercarriage, but all four squadrons had arrived and the rest of the airfield was complete by last light on the 30th.

The squadron left for Amiens early on 2 September and, despite congestion around the River Seine crossing, the light convoy arrived at Amiens/Glisy that evening. The heavy plant joined them early the following day, and work started on a grass strip which was used at 1655 hrs when the first Typhoon arrived. By 2030 hrs that evening, 140 Typhoons from Nos 124 and 143 Wgs were parked on the airfield.

A detachment left Amiens/Glisy on the afternoon of 4 September to join their Squadron Commander at B51, Lille/Vendeville, and despite a group of Germans with 88 mm guns close by, started work on the heavily cratered airfield. The rest of the squadron joined them the following day, sadly without Flying Officer Hawkins who had died in a motorcycle accident on the way. By 1700 hrs on the 6th, thirty-four craters had been filled with rolled chalk, eighteen unexploded bombs had been removed and the airfield was ready for the Spitfire IXs of No 145 Wg when they arrived on the 12th.

No 5022 Sqn and the Wing Headquarters moved to a chateau at Halle, near Brussels, on 7 September. They had covered some 300 miles since leaving what was left of Condé two weeks before, and a

few hours off in the newly liberated city were very welcome.

Meanwhile, 5023 Squadron had left Evreux/Fauville, on 3 September and moved through Amiens to repair the runway at B54, Achiet. They arrived there on the 4th, and while one flight cleared the Germans from a nearby wood, the rest of the squadron filled in the forty or so craters on the runway and made it usable by 2100 hrs. Arriving in Lille on the 5th, three flights moved on to an American airstrip, A84, Chièvres, where they started preparing a grass strip at 1000 hrs onto which the first aircraft landed three hours later. Finally, the whole squadron joined the rest of the wing for a short break at Halle on the 7th.

Early occupation and use of the airfield at Eindhoven was important to the success of Operation MARKET GARDEN, both as a base for the fighter-bomber wings and for casualty evacuation. The Germans had built three new runways and installed an extensive drainage system on the airfield which was prone to flooding, but there were over 1,600 craters on the airfield surfaces as they had been heavily bombed by the Allies and damaged by the Germans who had also demolished all the buildings and hangars before they left. Furthermore, the Dutch contractors who had built the extensive drainage system under duress had sabotaged it as they did so; some pipes had been laid so that the water flowed either too slowly or the wrong way, and others did not carry any water away at all because they were not connected to the rest of the system.

A decision was made to move a team from 5357 Wing to Eindhoven to make the airfield usable as soon as possible after the Germans had been evicted, the wing was instructed on 8 September to move a light scale detachment to XXX Corps who would give it priority of movement, and three flights of 5023 Squadron left Halle on the 10th to join the Guards Armoured Division.

The rest of the squadron moved to B66, Blankenberg, on 17 September to work on the roads and dispersals and then joined the Wing Headquarters at Bourg Leopold on the 19th.

A detachment from 5022 Squadron moved from Halle to B64, Diest, on 11 September to build an 1,100-yard advanced refuelling and re-arming strip. The site was difficult and hilly and it required more earth-moving than usual before a Square Mesh Track runway could be laid, but it was finished on the 15th when the rest of the

squadron joined them. Their first mail for sixteen days also arrived that evening and had to be sorted in the local pub because it was the only place with any light – or any beer. They left the following morning and moved to Bourg Leopold to join the Wing Headquarters and the remainder of 5023 Squadron.

Meanwhile, the three flights with XXX Corps had built two Auster strips near Louvain, some 20 kilometres east of Brussels, before crossing the Albert Canal on 16 September. They then spent the next three days and nights on the road with the Guards Armoured Division, the menu en-route being tea, bully beef, biscuits, repeated scares by day and bombing by night. They survived intact, however, and were delivered to B78, Eindhoven, on the 19th, two days after the start of MARKET GARDEN.

German forces were active close by when the detachment arrived, so half manned defensive positions while the other half started to prepare a grass strip. They were bombed as dusk fell, and the American paratroopers who had entered the airfield with them withdrew, leaving the ACS airmen to look after themselves. They found the next morning that they were within range of the German guns as they worked, and they sighted a German patrol during the day which they engaged, capturing three of them. Nevertheless, despite these distractions, they managed to complete the grass strip on the 21st from which No 124 Wg's four Typhoon squadrons were able to operate the next day, and they started to repair a 1,200 yard long concrete runway.

The Wing Headquarters arrived at B78 in the afternoon of the 21st. No 5022 Sqn joined them in the late afternoon of the 22nd after being held up for a while en route when the Germans temporarily cut the road ahead, and the last elements of 5023 Squadron arrived on the 27th.

With the headquarters and both squadrons now at Eindhoven, 5357 Wing was able to concentrate on repairing and rebuilding the airfield. No 5022 Sqn's Form 540 for September records their being told they were likely to stay at Eindhoven for three weeks, so they prepared a more permanent base. However, with the failure of Operation MARKET GARDEN and the weather deteriorating, the advance had stalled, and they were not to leave for six months.

Eindhoven was to be the most important task through the winter of



*A Typhoon of No 439 Sqn negotiating a waterlogged B78.*

1944-45 for the wing, and particularly 5023 Squadron. The conditions were difficult throughout. There was a constant threat of attack from the air and the ground; 5022 Squadron records being attacked on the airfield on Boxing Day 1944 by German forces, including paratroops, and in the early days at Eindhoven the Typhoons would take off, fire their rockets into the German forces some three miles away and land to be rearmed, all in a few minutes. The weather was also very bad that winter. It was cold and wet, which was particularly demanding for the 5357 Wing personnel working outside and for the aircrew and ground crew of the squadrons based on the airfield. The flooding from the heavy rainfall in November 1944 was made even worse by the parlous state of the drainage system which needed to be completely rebuilt, but as there was neither the time nor the opportunity for that, a temporary scheme of open ditches to drain the worst areas had to suffice. Nevertheless, with emergency measures to combat flooding whenever it occurred, constant repair work on the airfield pavements, and the construction of new taxiways, dispersals, roads and buildings, the airfield remained operational.

And there were some lighter moments. King George VI arrived in a Dakota on 11 October to be met by Field Marshal Montgomery and, to quote No 181 Sqn's Form 540 for the month, to be driven through 'lines of wildly cheering airmen.' The BBC visited to discuss a talk on the Airfield Construction Service, and Squadron Leader Pooley visited 5023 Squadron to carry out a formal investigation into its MT



Records. And then there was football. The wing's Form 540 faithfully records the results of 5357 Wing's team's matches against Service and local football teams: they beat 83 Group Police Unit 14-0 which, bearing in mind the occasionally uneasy relations between the RAF Police and ACS airmen, might have been a tactical error; they beat 122 Wing 6-1, 83 Group 9-1 in the 83 Group Cup Semi-Final, and 121 Wing 7-6 in the Final to receive the Cup from the AOA, 83 Group. And in one of their matches against civilian clubs, they drew 1-1 against a local team called PSV Eindhoven.

While 5023 Squadron was dedicated to B78, No 5022 Sqn was employed in the wider area. On 18 October it took over responsibility for B82, Grave, from 16 ACGRE who were neither sorry nor slow to hand it over. It was a horrible site on the left bank of the Maas, some



*Locally employed labour at work on the airfield at B88 Heesch; the Spitfires belonged to No 412 Sqn.*

10 miles south-west of Nijmegen; wet, almost inaccessible, and generally unhealthy, and a decision to abandon it was made on the 26th. One flight then moved back to Diest which was in a poor state because of the weather and flooding; two flights returned to Eindhoven to help 5023 Squadron mixing and laying concrete on the runways, and the rest of the squadron moved to B88, Heesch, to support 16 ACGRE. The widespread elements of 5022 Squadron finally came together at Diest on 19 November to drain the site and lay a new SMT mat to receive No 125 Wg's Spitfire XIVs.

They left Diest on 18 December and moved back to Eindhoven where the wing was working hard to keep the airfield operational despite the weather, the broken drainage system and attacks by German forces. On New Years Day, Eindhoven was heavily attacked during breakfast by the *Luftwaffe's* Operation *Bodenplatte*, a concentrated air attack against the Allied air forces on the ground. Many RAF aircraft were destroyed; buildings were set on fire and there were some casualties, including two dead and two wounded from 5022 Squadron. However, the fires were soon put out, the debris cleared away, all the damaged aircraft replaced from reserves within a week, and operations resumed as soon as the weather allowed. But then a rapid thaw at the end of January caused extensive flooding and serious damage to the airfield pavements, particularly those areas



paved in brick. The wing had to work round the clock to control the flooding and repair the damage to keep the airfield working, but the emergency repairs were largely completed by the middle of February, and work on enlarging and improving the airfield pavements continued while the wing prepared to hand over responsibility for B78 and resume their role supporting the front line when the offensive got underway again.

A reconnaissance team surveyed the site at B102, Vorst, on 18 March, and 5023 Squadron left Eindhoven on the 19th, crossed the Maas at Venlo and moved into Germany to lay an 1,100 yard by 40 yard PSP runway and four PSP hardstandings at Vorst; they were joined by a detachment from 5022 Squadron on the 23rd, and the work at Vorst was finished on 5 April. The rest of 5022 Squadron finally left Eindhoven on 31 March and moved to Hül's, some 17 miles north-west of Dortmund, where the detachment from Vorst joined them.

A wing reconnaissance party with an escort of RAF Regiment armoured cars surveyed the airfield at B112, Hopsten on 6 April. Hopsten was a permanent airfield, but its three runways were badly cratered, and the buildings had all been demolished. Nevertheless, the wing undertook to prepare a grass strip within 24 hours and repair one runway within three days. The reconnaissance party was then attached to the Guards Armoured Division for a survey of Bremen airfield, but it had to report two days later that it had no hope of reaching it for some days.

No 5022 Sqn received an order to move to Hopsten on 5 April. They were delayed at the Rhine crossing, but finally arrived on the 7th to find forces in action only two miles away. A grass strip was prepared in 24 hours which was used by No 122 Wg's Tempest Vs when they arrived on the 11th and No 124 Wg's Typhoons when they joined them on the 12th, and one of the cratered runways was repaired and usable by mid-day on the 13th.

No 5023 Sqn handed Vorst over to the Royal Engineers on 5 April, crossed the Rhine and drove to Borghorst, a distance of about 100 miles, arriving there on the 7th. It then crossed the Dortmund-Ems Canal and reached Hopsten on the 12th where it cleared the dispersal area. Another long drive took the squadron about 130 miles to Hoya, on the banks of the Weser. There they joined the Wing Headquarters on the 14th and built two Auster strips in the area while waiting to

move further. There was a nasty moment on the 15th when the *Luftwaffe* tried to bomb the bridge over the Weser while the squadron's plant was parked nearby. Fortunately, the *Luftwaffe* failed to cause serious damage to either.

The wing's reconnaissance party reached B154, Reinsehlen, on the 18th. The airfield had been ploughed by the Germans, but the party reported that it was otherwise in excellent condition and could be operational in 48 hours. No 5023 Sqn left Hoya at 0430 hrs on the 19th, crossed the Weser and the Aller, reached Reinsehlen shortly after 1100 hrs and started to make the airfield ready to receive the seven Spitfire squadrons of No 127 Wg and No 39 (Reconnaissance) Wg. By the evening of the 20th a grass strip and dispersals were ready for use, and by the time the first squadron arrived on the 26th, the squadron had built two Auster strips for 21st Army Group and started to lay an SMT runway alongside the grass strip at Reinsehlen which they completed on the 29th.

No 5357 Wg received an instruction from 12 ACGRE on 25 April to survey Stade airfield, on the west side of the Elbe opposite Hamburg. The Germans were still there in force, however, and the survey party had to retire. Then, on 1 May, they were instructed to reconnoitre Lübeck airfield with a view to operating a fighter wing from there. An attempt by a small party on the 2nd failed, but 5022 Squadron had arrived from Hopsten on 30 April, and a detachment from the squadron with its plant and an RAF Regiment flight drove to Lübeck on 3 May along roads crowded with Allied Prisoners of War moving westwards and German troops trying to surrender. They were the first British troops to set foot on B158, Lübeck, which was still occupied by the *Luftwaffe*. Apart from a few craters on the runway, they found the airfield to be in full working order, and they started to prepare a grass strip while the *Luftwaffe* personnel were taken away to a POW cage; the small civilian staff remained to help them. The rest of the squadron arrived on the 5th, and the repairs to the runway were completed in time for three squadrons of Typhoons and one of Meteor IIIs to fly in on the 7th, together with a *Luftwaffe* squadron from Norway which came to surrender and a fleet of Lancasters which arrived to start repatriating Prisoners of War.

The Guards Armoured Division captured B162, Stade, early on 3 May, and the survey party followed it in. News of the capitulation of

German forces in North-West Europe reached the wing on 4th and on the 5th the Wing's Headquarters arrived at Stade, and 5023 Squadron started to repair the concrete runways there in preparation for the repatriation of Prisoners of War. On 8 May 1945, with 5357 Wing Headquarters and 5023 Squadron at Stade and 5022 Squadron at Lübeck, Germany surrendered, and the war in Europe was over.

The wing had travelled some 400 miles from Normandy to Eindhoven in the first nine weeks, kept the airfield at Eindhoven operational for six months, despite everything the weather, the fragile infrastructure and the enemy could throw at them, and then travelled the last 300 miles in about six weeks; during all this time they delivered or helped to deliver seventeen operational airfields and fifteen functional Auster strips from virgin fields or bomb sites in impressively short timescales. But, whilst the war in Europe was over and Servicemen started to think about demobilisation and returning to their families, the Second World War was not over, and a number of those in 5357 Wing received postings to a new Airfield Construction Wing forming in the UK and bound for the Far East. It was Shield Force, 5358 Wing, and its story is next.

#### Notes

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## SHIELD FORCE: 5358 WING AND THE LIBERATION OF HONG KONG

### Brian Corbett



*Brian Corbett served in the ACB from 1955 to 1957 with No 5003 Sqn at Lichfield and No 5357 Wg at Eindhoven, where he was the Civil Engineering Officer, Low Countries. After leaving the Service, he specialised in the design of foundations for large structures before lecturing on civil engineering construction in the UK and at European Universities on both sides of the Iron Curtain. He is a long-term member of both the Royal Air Force*

*Airfield Construction Officers' Association and the Airfield Construction Branch Association.*

Brian Corbett was unable to be at Hendon so his paper was read by  
Wg Cdr Dick Turpin.



*Dick Turpin joined the RAF in 1953 as an MT Mechanic before transferring to the ACB as a Plant Fitter in 1957; as an airmen he served in the UK, Germany and Cyprus. In 1963 he became an air signaller before being, commissioned as an AEO in 1967. His aircrew career embraced four Vulcan squadrons, a tour with No 51 Sqn and ground appointments at Lyneham, Rheindahlen, Wyton, High Wycombe and the MOD. After retiring in*

*1994 he became involved in local politics, culminating in a six-year stint as Leader of Huntingdonshire District Council.*

Plans for the formation of the Airfield Construction Wings to be deployed as part of the Royal Air Force's contribution to the war in the Far East had been laid down in the latter part of 1944. No 5358 Wg was to consist of 5024, 5025 and 5026 Airfield Construction Squadrons, 5207 Plant Squadron, 53 Repair Unit (Plant), 5155 Mechanical & Electrical Squadron and 4857 Quarrying Flight, together with an RAF Regiment unit and support elements comprising medical, catering, admin and equipment staff to enable the wing to

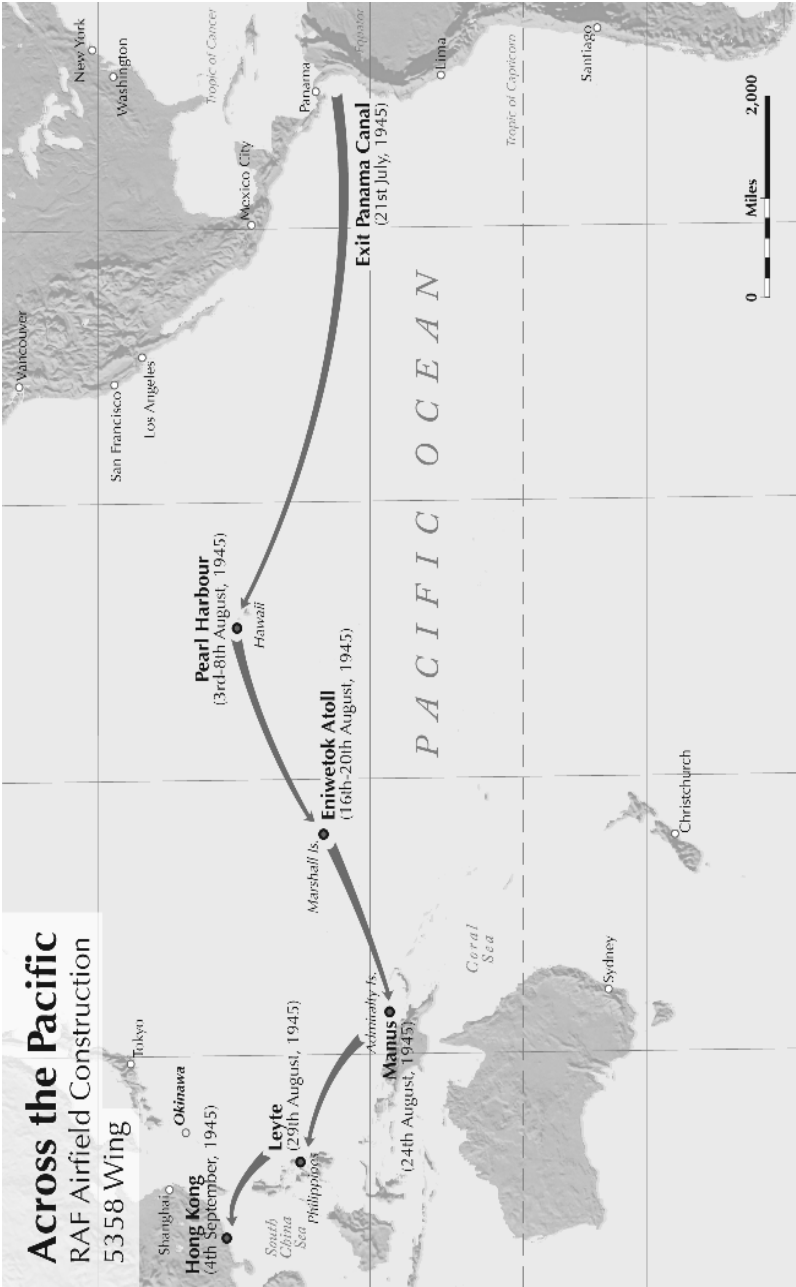
operate independently in the field. The wing's intended task was to be the construction and maintenance of airfields on the islands across the Pacific to support Tiger Force, the British Commonwealth long-range heavy bomber force being formed under the command of Air Marshal Sir Hugh Lloyd to attack targets in Japan.

No 5358 Wg was formed at No 6 School of Technical Training at Hednesford, a station that even during wartime was 'closed' at weekends, so airmen arriving after mid-day on Saturdays had to carry everything up 'Kit Bag Hill' from the railway station.

The wing sailed from Liverpool on 6 July 1945 on His Majesty's Troopship *Empress of Australia* accompanied by eight SAM Class Liberty ships – that's nothing to do with missiles but rather, Superstructure Aft of Midships – carrying the wing's plant and some 300 vehicles with about twenty airmen to maintain and operate the plant in each ship; they sailed from Birkenhead and joined the convoy in the Irish Sea.

Okinawa had been captured by American Forces between 1 April and 21 June 1945 with the aim of providing a base for the invasion of the Japanese homeland. The island was the ultimate destination for the convoy, although 5358 Wing was not told this at the time. With the Atlantic now free from U-Boats, the convoy sailed to Colón, close to the entrance of the Panama Canal, arriving there on 18 July. There the airmen were given three hours ashore and five dollars which they spent on candy, Coca Cola, fruit, chewing gum and books, almost unknown luxuries to most of them at that time, before entering the locks on the 21st. After exiting the canal the same day at Panama City, the convoy linked up with its US Navy escort of five destroyers. Although by this time the Japanese surface fleet was virtually non-existent there were thought to be a small number of Japanese submarines still operating in the Central Pacific.

A further two weeks sailing saw the *Empress of Australia* reach Pearl Harbor where there was general relief at the opportunity to disembark in Hawaii with yet another five dollars to spend on such luxuries as ice cream and fresh fruit, and although much of Honolulu was out of bounds to Service personnel, they were able to enjoy a number of facilities, including the golden sands of Waikiki Beach albeit still covered in barbed wire. It was while they were there that they heard about the dropping of the first atomic bomb on Hiroshima



on 6 August. Re-embarking on the 8th, the Force sailed for Eniwetok Atoll in the Marshall Islands to give the Air Ministry time to figure out what to do with some 2,600 airmen in the middle of the Pacific. It was during this part of the voyage that the men of Shield Force heard news of the second bomb on Nagasaki, and finally on 15 August that the Japanese Government had accepted the terms of the unconditional surrender demanded by the Allies. Nonetheless they were glad to have the US destroyer escort protecting the convoy right up to the end of hostilities.

Admiral Lord Louis Mountbatten, Supreme Allied Commander South East Asia, issued an order to Rear Admiral Harcourt to proceed to Hong Kong on his flagship, HMS *Indomitable*. The Royal Navy, with the Royal Marines, were to accept the surrender of the Japanese troops on Hong Kong Island, and Shield Force was to be diverted from its passage to Okinawa to Kowloon and the New Territories, with the priority task of making Kai Tak suitable for flying operations. The extent of the task that the relieving forces would be faced with was not, however, known at this time.

After four days spent refuelling and loading supplies at Eniwetok, the convoy sailed again, although they still did not know their final destination. On 24 August, the *Empress of Australia* arrived at Manus in the Admiralty Islands where Wing Commander Haines took command of 5358 Wing and announced that the destination was to be Hong Kong where they would be involved in relief and rehabilitation operations for which additional stores were taken on board.

On the voyage a record was compiled of the civilian trade skills and experience of all those on the wing which was to be particularly useful later.

Approaching the Philippines the convoy ran into a ferocious tempest and had to shelter on Leyte Island. The *Empress of Australia* then sailed ahead of the convoy to Hong Kong, berthing in Kowloon on 4 September.

An advanced party of seven officers and fifteen other ranks from the wing had flown out to Okinawa in two Liberators. Their route took them across the Mediterranean to India, and then over the mountains to China and on to land at Kadena airfield, Okinawa on 11 August, where they immediately began to survey possible airfield sites for the RAF's Lancaster and Lincoln bombers. After the surrender of Japan,

however, they left Okinawa by air for Leyte in the Philippines, where they embarked on 1 September on the SAM Liberty ships carrying the plant, arriving in Kowloon on the 6th and disembarking on the 8th.

Rear Admiral Harcourt's flagship proceeded towards the colony supported by the battleship HMS *Anson*, the aircraft carrier HMS *Venerable*, the cruisers HMS *Swiftsure* and HMS *Euryalus*, and a screen of four destroyers. The first ship to berth in Kowloon on 30 August was the Royal Canadian Navy Armed Merchant Cruiser *Prince Robert*. She was also the first ship to tie-up in the colony while the Royal Navy were still at anchor in Hong Kong harbour.

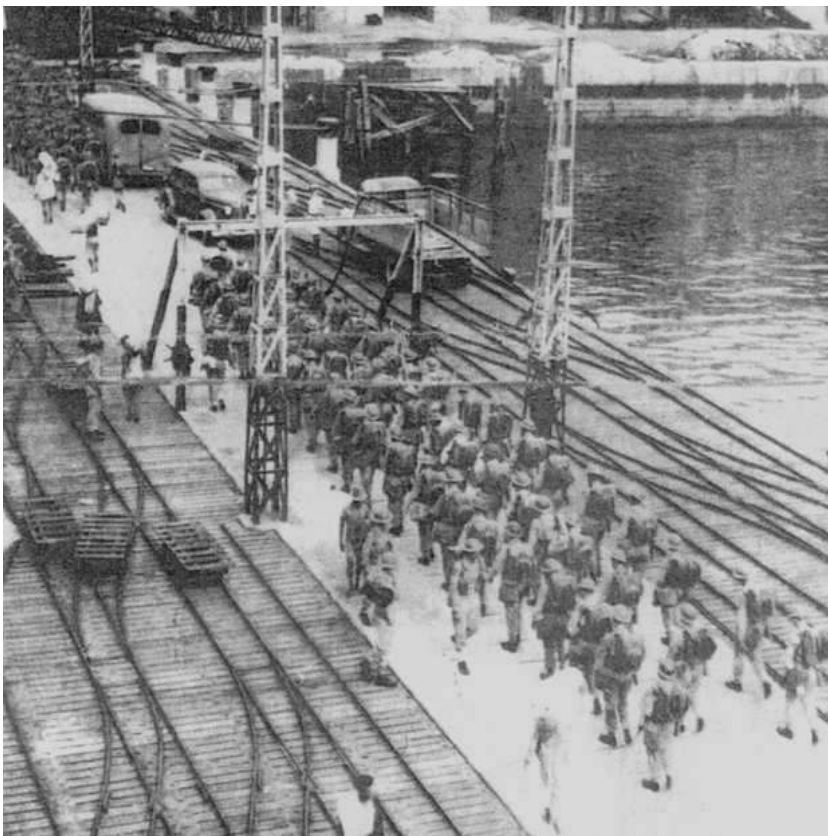
Rear Admiral Harcourt had first to identify the extent of the minefields around Hong Kong harbour and decided to transfer his flag to HMS *Swiftsure*. Commander Craven, who had been Staff Officer (Operations) in Hong Kong before the war, acting as the representative of the former Colonial Secretary, Mr Gimson, flew out to HMS *Indomitable* off Hong Kong to discuss the state of affairs that existed and to finalise instructions for the surrender of the Japanese garrison. Mr Gimson and the other internees had discharged themselves from Stanley Prison Camp on 19 August and set up a provisional government on the island.

Contact was made with the Japanese Commander in Hong Kong who had agreed to the signing of a surrender document onboard HMS *Indomitable* and for a Japanese officer to be flown to the carrier from Kai Tak. An Avenger, with an escort of Hellcats, was despatched to the airfield on 29 August to collect the Japanese officer, but unfortunately they got lost in bad weather on the return trip to Kai Tak and were forced to land in China. The Japanese officer was only saved from almost certain execution by the aircrew protesting that he was already their prisoner!

The first men to land on Hong Kong island were the Royal Marines from HMS *Swiftsure* who were commanded by Commander W L M Brown DSC. With the help of men from HMS *Euryalus* the dockyard was cleared of the enemy by the evening of 30 August; a military administration was established by proclamation on 1 September, and Rear Admiral Harcourt was appointed Commander-in-Chief and head of the Military Administration, in essence, the Governor, on the 2nd.

The *Empress of Australia* arrived in Hong Kong on 4 September, and at 1500 hrs, 5358 Wing Headquarters and 5025 Airfield





*4 September 1945 – 5358 Wing HQ and 5025 Airfield Construction Squadron disembarking in Hong Kong.*

Construction Squadron disembarked under orders from Rear Admiral Harcourt to start restoring law and order in Kowloon and the peninsula, including Kai Tak airfield which had been sabotaged by the Japanese after the surrender on 15 August. The immediate tasks were to disarm and intern the Japanese troops and to find accommodation for personnel and administration, and a detachment of 5026 Squadron was sent straight to Kai Tak to assess the work required to make the airfield usable.

As the rest of the wing came ashore, each squadron was made responsible for law and order in an area of Kowloon and the peninsula



*Japanese prisoners in Hong Kong, 1945.*

and for managing the phased withdrawal of the Japanese from strategic points. Widespread looting was a particular problem initially, but firm action by the squadrons soon brought it under control. After some initial confusion between the squadron patrols and the Royal Marines, who were also patrolling Kowloon, the Royal Navy handed over their duties on Kowloon and the peninsula to the Royal Air Force and withdrew to Hong Kong island. Japanese in small and large numbers were rounded up and disarmed and altogether it was estimated that the 2,600 personnel of the wing dealt with some 18,000 Japanese troops.

Kowloon was in a parlous state of disrepair. Food was in short supply. The electrical power supply was virtually non-existent; the generators were broken down and there was very little fuel, particularly for the two boilers that had been converted by the Japanese to burn wood. Accommodation was also a problem, and in most cases billets had to be found in buildings which had been stripped of all furnishings and equipment. Suitable accommodation for the

Wing HQ was a particular challenge and, having set up initially in the vacant YMCA building, they transferred after a few days to the Kowloon Hotel only to find that it was infested with a particularly large cockroach, known as the Bombay Tiger, which rested during the day but came out at night and scurried about the floors. The wing had been issued with DDT sprays, but the cockroaches were unimpressed by these, so Squadron Leader Cedric Rosenvinge, one of the wing's civil engineering officers, collected plaster of Paris and a mortar and pestle from one of the medical officers, mixed finely ground plaster of Paris with an equal amount of finely ground granulated sugar and put the mixture on pieces of paper around the room. The cockroaches all died, presumably of acute constipation, and the rooms were cleared of the pests in about a week.

The Royal Navy had formally reoccupied Kai Tak airfield on 3 September and hoisted the White Ensign, but when 5358 Wing arrived on the 4th the airmen proclaimed it to be RAF Kai Tak and hoisted the Royal Air Force Ensign. It was then decided that the station would be jointly occupied, with two camp areas and two sets of maintenance areas. However, after many, sometimes nearly disastrous experiments at dual air traffic control, it was decided that the RAF should have sole control of that function.

The first task had been to make the runway safe, and 5358 Wing had made the airfield operational within three days, with the Quarrying Flight undertaking the task of clearing the bomb dumps and ammunition stocks.

Two of the Airfield Construction Squadrons were relieved of their military and garrison duties on 11 September so they might concentrate on improving and extending airfield facilities in Hong Kong, initially at Kai Tak, whilst separate instructions were to be issued for a new airfield to be built for heavy transport aircraft. As well as the repair of facilities, Kai Tak was to be improved for fairly intensive operations by Dakotas, Mosquitos and similar types of aircraft.

The first RAF unit at Kai Tak was the Air Headquarters Hong Kong Communications Squadron, which was formed there on 12 September, and it was joined on the 15th by No 132 Sqn with its Spitfire XIVs and on the 27th by No 681 Sqn with Spitfire PR XIXs.

Air Commodore W A D Brook CBE, who would have been AOC



*Kai Tak airfield, with Kowloon at lower left, 1945.*

Air Forces for Operation ROGER (a planned occupation of Phuket as a precursor to an invasion of Malaya), had the Japanese not surrendered, making this superfluous, was appointed AOC RAF Hong Kong on 15 September. He recorded in a letter to higher authority that, although alien to their principal training, the Airfield Construction Squadrons performed superbly in policing operations and in restoring law and order. This, he noted, caused some consternation in the higher echelons, and subsequently the Airfield Construction Squadrons were ordered to concentrate on their main task, the construction and maintenance of airfields. He felt that aircrew personnel, mainly fighter pilots, could apply themselves to a variety of ground duties such as prison supervision, while the Airfield Construction Service personnel, with their greater technical knowledge, should more properly employ themselves on the repair of the infrastructure!

And the infrastructure certainly needed repair. The Japanese had totally neglected civic administration, except in so far as it affected themselves. There was no transport; the electrical power supply was

limited and unreliable, and public health had been completely ignored. These problems—were to form the wing's essential tasks, with the electrical power supply an obvious priority. In the situation at that time, a blackout of the peninsula would have undoubtedly led to wholesale looting, and worse, and the Commander-in-Chief had ordered that the supply be maintained at all costs. The supply of fuel was the main problem. Because of the lack of coal, the Japanese had converted two of the boilers to wood burning. A safe supply of wood had to be secured, therefore, until coal became available from Australia.

A reconnaissance party in a recommissioned engine of the Kowloon-Canton Railway penetrated into the New Territories, which were still occupied by armed, but fortunately quiescent, Japanese. Large stocks of wood were discovered at Tai Po and Fan Ling, twenty and fifteen miles out respectively, and the Chinese Communist Army allowed the party to cross the border and retrieve some abandoned railway trucks. Although at one time the fuel supply was so tight that the plant was within 15 minutes of closing, 5358 Wing managed to keep the power supply working throughout the period.

Meanwhile, work was proceeding in the power station to repair the generators, and the value of the record of the wing's skills compiled on route to Hong Kong now became apparent. Only one of the six generators was working and that had had little maintenance over the past 3½ years. However, the skills to overhaul and start No 2 Unit were located in the record, and with this one on line No 1 Unit could be stripped down, overhauled and kept as a stand-by. Units 3 and 4 had been removed by the Japanese, but Units 5 and 6 were still in position, and by 20 September they had also been overhauled and prepared for service. As a collier was on its way from Australia, the two wood-burning boilers were converted back to coal, a job on which AC1 Hughes, who the record knew to be a boilermaker by trade, carried out invaluable work. The power distribution network, which the Japanese had interfered with, was also repaired and maintained by tradesmen from 5155 M&E Squadron.

The Kowloon-Canton Railway, running through the New Territories and across the Chinese Border, had been blocked since 1942 when the Royal Engineers had sabotaged the tunnels. 5358 Wing cleared most of the debris from the tunnels, although the Royal Navy



claimed to have done some of the work. Squadron Leader Ronald MacKintosh had the job of ensuring that the tunnels were safe. He did this by examining the linings of the tunnels by the light of some car headlamps as he was driven through them sitting on the roof of a tiny engine-driven rail car. He was able to report that the tunnels were safe to use; no such thing as ‘elf and safety’ to worry about in those days.

The railway line through to Canton was then surveyed by air and found to be clear. The wing serviced two engines, thirty pieces of rolling stock and six coaches in the railway workshops, a small amount of coal was found, and a regular daily service on the line was started on 11 September. Chinese troops then started to travel through to Kowloon for transfer to Shanghai, and Hong Kong’s main source of vegetables became accessible once more.

Before the SAM ships arrived all the vehicles in the peninsula, serviceable or not, were collected by the wing, and work started to bring them back into use. The wing's own vehicles had been waterproofed, as a beach landing had been expected, and between 10 and 30 September, 394 vehicles and 50% of the plant were made ready for use.

A priority task when the wing had come ashore had been the preparation of suitable facilities for hospitals and medical services. The Central British School was selected as the site for No 80 Mobile Field Hospital, although the building was in a poor state, like everything else. Nevertheless, the hospital was operational within three days, and one of the Medical Inspection Rooms treated more than 300 patients in one day. A clinic was also opened by Flight Lieutenant Spencer at Sun Hui Castle Peak where 60-70 patients a day were treated.

The runway at Kai Tak was too short for long range, four-engined aircraft, and it could not readily be lengthened at that time, so a new airfield had to be built with a 2,000 yards long by 50 yards wide runway to take four-engined transport aircraft with a weight of up to 150,000 lbs carried on a two wheel undercarriage. A possible site had been found at Ping Shan in the New Territories, some twenty miles from Kowloon, Squadron Leader MacKintosh took charge of the detailed survey, Flight Lieutenant Henry Grace, a soils expert, prepared the design, and Camp Brook, named after the AOC, was established to accommodate the personnel who would build Ping Shan Airport.

Ping Shan Quarry was developed by 4857 Quarrying Flight, and 18,000 tons of stone, together with 7,000 tons of overburden, was quarried in the first three months. Many distinguished visitors came to see the quarry at work, among them were Lord Louis Mountbatten, Admiral Lord Fraser and Air Marshal Sir Keith Park, while Rear Admiral Harcourt and Air Commodore Brook were frequent visitors.

With an output target of 2,000 tons a day from the quarry, it became clear that there would be insufficient ACS plant operators for the resulting task, so a Plant School was established to train local Chinese operators. The course lasted for six weeks; it covered the operation of the common types of civil engineering plant and, since a corporal plant operator was in charge of each course, which had no

more than seven students, the training was thorough and effective. Furthermore, on completion of the course students were sent out into the field to operate plant for two weeks under supervision before being allowed to go solo. A school for MT drivers was also opened alongside the plant school, and a third school opened for Chinese fitters who were experienced on petrol engines but lacked experience of the diesel engines used in plant.

The work of the wing at Ping Shan had been commended by Lord Mountbatten and Air Marshal Park, who had said that the new Ping Shan Airport would play a major part in the future of Hong Kong and trade with China. However, new international standards for the design of international civil airports then came into force. Ping Shan could not meet these, and although the RAF could have still used the airfield, the Air Ministry was not prepared to go it alone so the work on Ping Shan was abandoned. The work of the Plant, MT Drivers and Plant Fitters' Schools was not wasted, however, for one of 5358 Wing's many legacies in Hong Kong was a well trained corps of plant operators, MT drivers and plant fitters able to play their part in rebuilding and expanding the city in the post-war years.

Food shortages were a problem when the wing first arrived in Hong Kong, but as time went on the Chinese came to various arrangements with the messes for catering, and well before the end of 1945 restaurants had been opened. I have no evidence, however, that the airmen had to order by numbers.

Entertainment for the airmen was as vital as good food to maintain morale. Cpl Kliff Fowler of 5024 Squadron presented reviews such as *Pukka Gen*, and there were visits by the professional entertainers of the Far East ENSA, but by the end of 1945 the patience of some of the airmen was wearing thin. Many were conscripts who had gone to France after D-Day, served in Europe until VE-Day and then been transferred to 5358 Wing and the Far East. Representations were made to the Prime Minister, Clement Attlee, about the slow rate of repatriation and demobilisation, but it was still almost a year after leaving Liverpool before the last member of Shield Force's 5358 Wing left Hong Kong for home. One of the last ships to leave was the *Taos Victory* (the 15-knot Victory ships were an improved design of the Liberty ships which could do only 11 knots). One detachment disembarked in Singapore and a second proceeded via Colombo and



Aden, disembarking in Liverpool in early July 1946. As far as is known, another of 5358 Wing's legacies was that its plant and vehicles were left in Hong Kong, although some of the vehicles may have been transferred to the Royal Navy for use on the island.

5358 Wing's contribution to the liberation, recovery and restoration of Hong Kong was a memorable achievement in many ways, not least because of the uncertainties of the time, the numerous changes of plan, and the unforeseen nature of many of the challenges that the wing faced. The Royal Air Force Airfield Construction community has every reason to be proud of 5358 Wing's performance, and it is grateful for this opportunity to put it on record, particularly as some accounts of the liberation of Hong Kong fail either to give the wing credit for its contribution to the success of the mission, or in some cases even to acknowledge that it was there at all!

This brings our story to the end of World War II and to the final part which will tell you what the Royal Air Force's Airfield Construction units got up to in the first twenty years of what passed for peace in the post-war world.

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## COLD WAR – WARM CLIMES,

### Sqn Ldr John Fox



*John Fox joined the ACB in 1957 and served with Nos 5001 and 5004 Sqns in Malta, Libya, Cyprus, Aden and the Gulf before commanding the M&E Training Flight at Wellesbourne Mountford. He transferred to the Technical Branch in 1963 and following a tour at Hullavington participated in recovering Brize Norton from the USAF and refurbishing its facilities. Relieved only by a tour in Cyprus, he spent eighteen years on the development of computer-based projects. On retirement from Cranwell in 1984, he became an Information Systems Manager in the water industry. He has been the Honorary Secretary of the RAF Airfield Construction Officers' Association since 2005.*

### Germany 1945 to 1957

With the end of the Second World War, the Airfield Construction Service ran down as personnel were demobilised. Of the wings in Germany, 5353 Wing returned to the UK in May 1945 for service in the Far East and 5354 Wing was disbanded in December 1945. The remaining squadrons were disbanded in 1946 and replaced by Airfield Construction Supervisory Units; these were largely manned by junior officers and SNCOs to control German direct labour and contractors' personnel employed on airfield works. The Airfield Construction Supervisory Units were then closed in 1947, 5355 Wing was disbanded in December of that year, leaving 5352 and 5357 Wings to deliver the works programmes for, what had become, the British Air Forces of Occupation on 15 July 1945 before reverting to the more popular name of the 2nd Tactical Air Force on 1 September 1951.

Most former *Luftwaffe* airfields had either good surfaces with poor infrastructure or good infrastructure with poor surfaces. It was decided to keep the good infrastructure and develop the airfields by laying PSP runways and dispersals until concrete pavements could be built. However, as all new PSP was reserved for the Far East war at that time, the wings had first to organise the recovery and reconditioning

of some 25,000 tons of PSP from the now abandoned temporary airfields that lay across North-West Europe.

Gatow was the sole British airhead in Berlin when the airlift started on 25 June 1948. A 4,500 feet PSP runway had been laid there in 1945 but, fortuitously, 5355 Wing had started work on a 6,000 feet parallel concrete runway in October 1947 before it was disbanded in December. The estimated completion date was November 1948, but the immediate needs of the Airlift changed that, and 5357 Wing's team at Gatow under Squadron Leader Wally Lenton completed it on 11 July. The team also extended the length of the PSP runway to 6,000 feet in case it was needed and increased the size of the unloading area using ballast from an unused railway line and rubble from bomb sites topped with recycled wearing course from the less important streets in the city.

Spares, repairs and replacements for Gatow's civil engineering plant normally came from the British Zone, but only a minimal service was now available, and the plant began to show signs of wear. Reinforcements were available from within the city, however, some of which were from another era. One of 5357 Wing's team's particularly reliable steamrollers had been made by Rustons of Lincoln in the late 1800s. It was being used by a road-mending team in East Berlin who were resurfacing a road one day that crossed from East to West near Gatow. As the team approached the crossing, the Russian guards stood back to allow them to lay and roll the new blacktop on the road as it ran through no-man's land. The British guards then also stood back as the team continued laying and rolling the new surface on the road as it entered the British Sector. And when the whole team was inside the British Sector, it became apparent that neither the team, nor their steamroller, had any plans to return.

The runway at Gatow had been designed for the normally modest amount of traffic, so when the sortie rate rose to one landing or take-off every 90 seconds for some 23 hours of the day, its surface began to show signs of distress. 5357 Wing's runway repair team only had access to the runway for an hour or so after midnight, and they were only able to patch the worst of the day's potholes with buckets of hot blacktop in that time. This could not have gone on for ever, and the runway would not have lasted much longer had the blockade not been lifted when it was.



All the initial Royal Air Force airlift sorties were flown from Wunstorf, but the airfield surface there deteriorated rapidly under the high sortie rate, and large areas of PSP had to be laid to keep it operational. Fassberg then became a second airhead on 18 July after its facilities were expanded, and civil, USAF and RAF aircraft subsequently also flew from Bückeburg, Lübeck and Schleswigland. When the USAF needed an airfield near the northern and central corridors to make best use of their expanding C-54 Skymaster fleet,



*Celle – November 1938.*

5357 Wing moved onto the grass airfield at Celle on 30 September 1948 to build a runway, taxiway and loading areas and to install a full airfield and approach lighting system. A team of thirteen officers and NCOs supervised a local labour force of around 1,500. A railway line was laid alongside the site for the 5,400 feet runway to deliver the hand-pitched stone for the base course; the blacktop wearing course was mixed on site and the taxiway and loading areas were laid in PSP. An RAF aircraft made the first landing on the new runway fifty five days later on 24 November and the first C-54 flew from Celle to Berlin on 16 December.

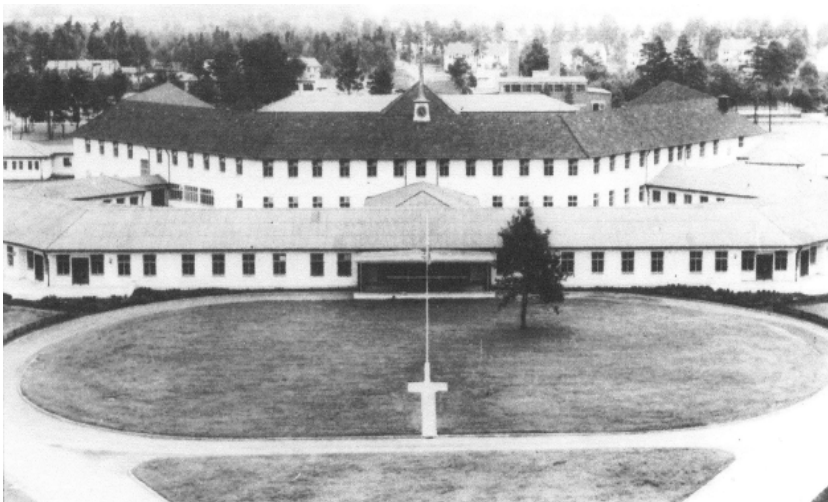
When the blockade was lifted at one minute past midnight on 12 May 1949, two Army armoured cars left the West to prove the route to Berlin. The all clear came at 0500 hrs, and the first military convoy into Berlin cleared the time-consuming Russian security and set off at a stately 20 miles per hour towards Gatow. It consisted of a number of heavy vehicles and items of civil engineering plant driven by officers and NCOs from 5352 and 5357 Wings led by, the then, Flight Lieutenant Ray Pixley, a Plant Officer on 5357 Wing. Ignoring the rules, they stopped for breakfast on the way and dined on

scrambled eggs and fresh local asparagus which they had swapped for tins of sardines before continuing towards Gatow. A huge temporary wooden bridge built by American engineers across the Elbe at Magdeburg then presented Ray Pixley with a problem. Its recommended maximum weight was 17 tons; the lead vehicle weighed 35 tons, and many others in the convoy weighed over 20 tons. However, a helpful local East German told him that the Russians had driven heavy tanks across the bridge the previous week, so he waved his convoy through. The vehicles made the bridge swing a bit, but they all crossed safely, and the convoy finally arrived at Gatow later that day where they received a very warm welcome.

The name of the Airfield Construction Service changed to the Airfield Construction Branch (ACB) on 17 November 1948 as its members continued to develop the RAF infrastructure in Germany. The increasing threat from the East rendered the airlift stations of Wunstorf, Celle and Fassberg too vulnerable, so a series of airfields known as 'The Clutch' were constructed west of the Rhine: Brüggen, Geilenkirchen, Laarbruch and Wildenrath. These airfields had an 8,000×150 feet runway with a parallel taxiway and operational accommodation for up to four squadrons, and they were built quickly. The first tree in the forest at Brüggen was felled in May 1952, and No 112 Sqn arrived on the station with its Vampire FB5s fourteen months later on 6 July 1953. No 130 Sqn joined them on 1 August. 5004 Airfield Construction Squadron re-formed at Brüggen on 1 September 1953 as an independent squadron under the direct control of HQ 2nd Tactical Air Force.

Air Commodore Dow was the Chief Engineer (RAF) in Germany in 1952 when he was invited to open the new RAF Hospital at Rostrup, near Celle. He was appalled by the length of the corridors and sketched an alternative design based upon two concentric octagons with corridors radiating out from a central services building. When reparation funds became available in 1953 for a new RAF Hospital at Wegberg, providing it was completed within the current financial year, it was based upon the air commodore's design, and 5357 Wing was given six months to build the hospital, the messes and the quarters. It was completed in 111 days and known from then on, with some poetic licence, as the '100 Day Hospital'.

The men and women of the ACB left their mark all over their part



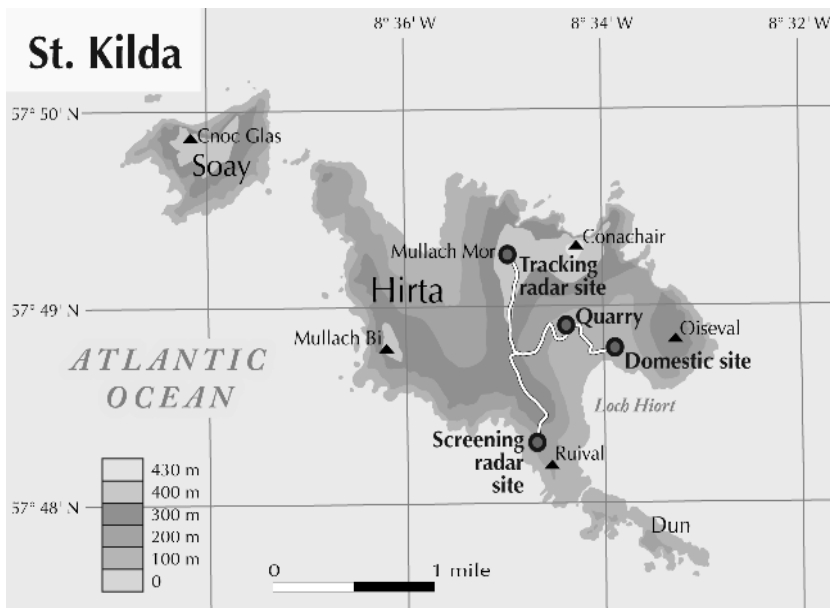
*Wegberg Hospital – 1953.*

of Germany in the shape of airfields, roads, railways and buildings of all shapes, sizes and uses from control towers to hangars, barrack blocks to hospitals and messes to cinemas. They delivered all that was ever asked of them in their time in post-war Germany. But all good things come to an end and 5352 and 5357 Wings were disbanded when the Air Ministry Directorate General of Works took over their responsibilities in 1957.

### **The UK 1945 to 1957**

Units of the Airfield Construction Service were spread across the United Kingdom when the war ended in 1945, but by the mid-‘50s the ACB was effectively concentrated in Warwickshire with the Airfield Construction Depot and 5003 Squadron’s Headquarters at Wellesbourne Mountford and the Plant Storage Depot, which housed the Royal Air Force’s reserves of construction plant, at Church Lawford. The depot housed specialist plant operating and development units, and its training wing ran courses for all the building and construction, M&E and plant operating and servicing trades as well as introductory courses for civil engineering, M&E and plant officers.

5003 Squadron was the source of trained personnel to reinforce the overseas squadrons; it maintained teams at short notice to support the



Repair and Salvage Units and the UK Nuclear Response Organisation with earth-moving and road-building equipment; and its detachments provided opportunities for newly trained tradesmen to consolidate their skills while they delivered projects to Service customers around the UK. These projects came in all shapes and sizes and priorities. Major tasks such as recovering Finningley from care and maintenance and preparing it to become a V-Force station or turning Brize Norton from a USAF B-47 base into the Royal Air Force's principal air transport station could consume a significant proportion of the squadron's resources for some time. Other, equally important, tasks might only occupy a small team for a few days, and some tasks were undertaken for their training value rather than for their importance to the Service. And then there were those small jobs a detachment might do before it left a station that had made it welcome: a bit of partitioning here, an improved coffee bar there, or a short length of concrete path across a muddy patch. 5003 Squadron was always very good at saying 'thank you' to a generous host.

5004 Squadron left Brüggen in September 1956 to join 5003 at Wellesbourne Mountford, and both squadrons were soon warned to be



ready to move north for Operation HARDROCK, the construction of a radar installation on St Kilda in the Outer Hebrides to track missiles launched from Benbecula and to ensure that the target area was clear of shipping. 5003 Squadron arrived on Benbecula in November 1956 to build a base from which 5004 Squadron could move to St Kilda and be supported there. The weather was unforgiving and life on Benbecula was frugal but, despite the rain and the storms, the huts, roads and jetties were finally finished in time for 5004 Sqn's advance party to be landed by a Royal Army Service Corps LCT on St Kilda on 16 April 1957. The rest of the squadron followed by the end of the month and settled in under canvas – or in an RAF Command Trailer if you happened to be the Task Force Commander. Over the next two summers, when the weather was frequently very difficult, the squadron quarried and crushed stone and built 3½ miles of road climbing to some 1,400 feet to provide access to the radar sites on the tops of two mountains, erected the buildings for the two radar heads and built the permanent domestic accommodation near the landing site. Despite the difficult terrain and the frequently foul weather, 5004 Squadron completed the whole installation by the end of August 1958 when it was handed over to the Royal Artillery.

### **Near and Middle East 1951 to 1957**

The post war involvement of the ACB outside of Europe commenced with 5355 Wing being reformed at Kasfareet in the Canal Zone of Egypt in November 1951, together with Nos 1 and 2 Works Squadrons, subsequently renumbered 5001 and 5002 respectively. 5001 Squadron was co-located at Kasfareet with the Wing HQ and covered the southern area of the Canal Zone whilst 5002 Squadron was based at Abu Sueir to cover the northern area. Both squadrons were deployed across a wide area of the Zone at the discretion of the Chief Engineer (RAF) at Headquarters Middle East, for emergency and installation work at such establishments as Abyad, El Hamra, Kabrit, Fayid, Shallufa, Fanara, Ismailia, Deversoir, Port Fuad, and El Firdan as well as at their own bases of Kasfareet and Abu Sueir. 5355 Wing and 5002 Squadron disbanded in October 1955 but 5001 Squadron lived on for a further eleven years.

In January 1954 a flight of 5001 Squadron was detached from Kasfareet to El Adem, 17 miles inland from Tobruk, to prepare the





*Kasfareet – 1954.*

station for a forthcoming royal visit and to resurface the runway. Shortage of manpower and constant breakdowns of the antiquated plant meant that the work fell behind schedule and it was not until the remainder of the squadron moved to El Adem from the Canal Zone in August 1955 that things improved. However, the improvement was short-lived as manpower was withdrawn to send detachments to Nicosia and Akrotiri where the EOKA problem, which started in April 1955, was causing a shortage of the reliable local civilian manpower that the Air Ministry Works Directorate (AMWD) needed to man essential services.

In the autumn of 1955 two detachments from the squadron undertook survey work at Coëtivy Island in the Seychelles and on Adu Atoll, in the Maldives, to assess their suitability as a location for a staging post for Hasting aircraft en-route from the UK to the Far East. These detachments had to be completely self sufficient with their own cooks and a doctor, some of whom were seconded from RAF Germany. Gan is the  $1\frac{3}{4} \times \frac{3}{4}$  mile, southernmost of twenty-five coral islands in Adu Atoll, some 800 miles south west of Ceylon. The

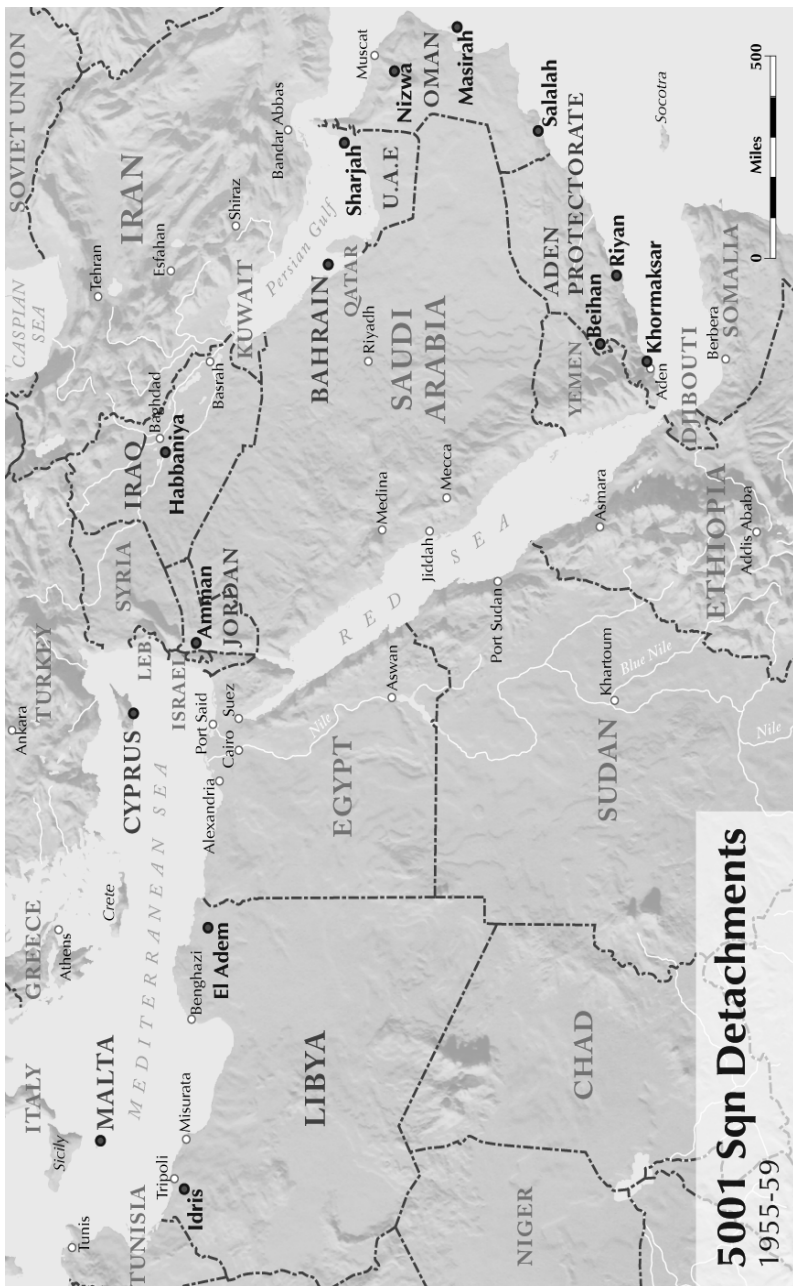


*El Adem – 1957.*

unobstructed approaches made it the preferred location for a 2,800 yard concrete runway and associated staging post facilities. The results of those surveys and the squadron's recommendations resulted in the building of the staging post on Gan and the associated Signal Centre on the nearby island of Hitadu. About a year later the squadron would be involved in the initial work for the construction of RAF Gan.

After just three months at El Adem, in November 1955, 5001 Squadron's HQ moved to RAF Idris, the former Italian Air Force base at Castel Benito near Tripoli, but leaving a major detachment at El Adem to continue with resurfacing the runway and other building work as the station was rapidly becoming a busy staging post and exercise base. The detachment comprised five officers and about 200 airmen and there were still smaller detachments at Akrotiri and Nicosia. Gradually, the tempo of work in Cyprus increased as the Suez crisis evolved, to add to the problems already caused by EOKA, and the squadron strength was substantially increased.

In August 1956 all foreign labour was excluded from RAF Nicosia and RAF Idris. M&E personnel from the squadron took over the running of the electrical power, water and sewage systems, under the direction of UK-based AMWD staff whilst the building and civil engineering personnel hurriedly prepared temporary accommodation



for families who were being brought into the confines of the bases for their safety.

The Akrotiri detachment was reinforced by manpower from the UK drawn from 5003 Squadron and the ACB Depot. Its major task was to supplement the civilian contractor, John Howard, in resurfacing the runway. To do this, work proceeded round the clock in two twelve-hour shifts. The continual use of the plant caused numerous breakdowns and also men became fatigued so it was decided to reduce the working shifts to nine hours and use the gaps between shifts for maintenance and recuperation and this had the effect of actually speeding up the work. At the same time as the runway was being worked on the bulk fuel installation was extended. Similarly the detachment at Nicosia was busy with the runway extension, perimeter track resurfacing and hardstanding construction.

Meanwhile, back at El Adem, the detachment constructed a bombing range fifteen miles into the desert south of the main camp. The central target and three markers together needed 1,000 cubic yards of whitewashed crushed stone. Heavily 'bomb proofed' observation shelters were built, 3,000 yards from the target, which subsequently withstood the occasional, what in cricket terms, could be called 'a wide'. The work at El Adem inevitably slowed as manpower was re-directed to Cyprus.

An advance party from 5001 Squadron, comprising an officer and five tradesmen, returned to Suez briefly in November 1956 as part of Operation MUSKETEEER (the Suez campaign). Initially the plan was for the party to parachute into El Gamil airfield, just west of Port Said along with 3 Para but common sense prevailed as, with no prior parachute training, the risk to life and limb could not be justified. Instead the party flew in as soon as the runway was secured by 3 Para and cleared of obstructions laid by the Egyptians. The party commandeered plant from the harbour at Port Said ready to carry out any repair work that might be necessary both at Gamil airfield and the disembarkation point for the seaborne forces but, in the event, as we all know, withdrawal took place shortly after the landings.

Also in 1956, 5001 Squadron had a survey party in Malta, where it remained until 1958, with frequent changes of personnel, carrying out work on the airfields at Luqa, Safi, RNAS Hal Far and the Signals Unit at Siggiewi.



*Gan – 1957.*

Following the successful survey in the Maldives, the Maldivian Government agreed to lease the islands of Gan and Hitadu to the British Government., Operation SHIP'S FLAG was therefore launched at the end of January 1957; this was the initial phase of the construction of RAF Gan and the Signals Unit at Hitadu

The initial party of thirteen officers and men from 5001 Squadron, together with twenty support personnel, mainly from units in Germany, comprising cooks, drivers, mechanics, communications personnel and a doctor sailed from Ceylon on board MV *Bridlington* and, en route, picked up the Maldivian Prime Minister who proved to be invaluable in placating the inhabitants of the two islands, many of whom had to move their huts and in some cases relocate to the neighbouring island of Fedu. With no readily available quayside for unloading the heavy equipment, the detachment had to improvise offloading facilities; thankfully there were no Health and Safety regulations in those days. As was so often the case with ACB detachments, its first task was to build its own accommodation before proceeding with the main task – refurbishing the old wartime airstrip to provide an airhead for the main contractors, Costains, who would



*A Sunderland 'opens' the runway at Gan.*

build the concrete runway and the camp itself. Medical treatment for the island's inhabitants, coupled with joy rides in the Land Rover, ensured harmonious relations between the detachment and the inhabitants, many of whom were employed on clearance and construction work. Throughout the detachment, it was supplied from Trincomalee, in Ceylon, by Sunderlands of Nos 205 and 209 Sqns and so it was fitting that the completion of the runway was marked by a fly past of one of these aircraft. Mercifully it did not make the first landing; that privilege was accorded to a RNZAF Bristol Freighter on 30 August 1957. Costains were then able to carry out their work and the concrete runway was completed on 18 March 1959.

During 1957 and 1958 yet more detachments were loaded onto the squadron: Habbaniya (Iraq), Sharjah (Persian Gulf), Khormaksar (Aden) and Nizwa (100 miles inland from Muscat) where a sand runway, suitable for Pembrokes, had to be hurriedly prepared.

1958 was a busy year, particularly for 5001 Squadron's M&E Flight. The power house at El Adem was extended and overhauled and an additional diesel alternator set installed. In view of growing political instability in neighbouring countries, a new 48,000-gallon Bulk Fuel Installation (BFI) was also provided to replace the existing Italian-built facility which would probably have been unable to cope had the station ever been required to handle a major airlift operation. In the event this never happened but, for much the same reason and at



the same time, another BFI was installed at Amman, in Jordan, this one having a 72,000-gallon capacity.

No sooner had these tasks been completed than a major incident at Nicosia necessitated a large detachment, comprising all trades, being deployed there and to Akrotiri under Operation MUREX. EOKA had booby trapped the juke box in the transit NAAFI at Nicosia so that when a coin was inserted it exploded with devastating results and causing the death of two airmen (not ACB). All civilian labour was immediately excluded from the base and the detachment personnel took over their maintenance and installation duties, under the direction of UK AMWD engineers. Once again an overseas squadron was reinforced from the UK Depot and 5003 Squadron.

### **Aden 1954-1959**

There had been a detachment of 5001 Squadron in Aden as early as 1954 but its purpose is not recorded. The earliest recorded task for 5001 Squadron was in 1957 when it surveyed a route for a road up the 3,500 ft escarpment between Lodar and Mukeiras, 160 miles north east of Aden. Until then the only routes up this escarpment were three donkey tracks and it was by donkeys that personnel and the surveying equipment were transported up the escarpment. Mukeiras is 7,000 feet above sea level and the camp there was supplied solely by air from Khormaksar. The road, incorporating forty hairpin bends, was built by civilian contractors and today, having been vastly improved, it now forms part of the highway from the Yemeni capital, Sana'a, to Aden.

Other tasks followed quickly in Aden itself and elsewhere and throughout the Protectorate. At Dhala, an Army camp some 80 miles north of Aden and 3,000 feet above sea level, the task was to extend the sloping sand runway as the landings of RAF Pembrokes and Aden Airways Dakotas were, in the words of their pilots, becoming 'somewhat exciting'. The only way by road to Dhala was an 87-mile journey, partly through the notorious Dhala Pass where there were fairly frequent skirmishes between military convoys and rebel tribesmen. Workers on the airfield were guarded by armoured cars.

Back at Khormaksar the squadron extended the runway and constructed extra hardstandings to accommodate the build up of the RAF's strength which by 1959 comprised No 8 Sqn, originally with Venoms, and later Hunters, No 37 Sqn's Shackletons, No 78 Sqn's



*Beihan – 1958.*

Pembrokes and Twin Pioneers, No 84 Sqn's Beverleys and Valettas and a flight of Sycamores for search and rescue plus a miscellany of other aircraft, Canberras and Meteors for photo reconnaissance, two-seat Vampires and Meteors for currency and check rides and two VIP communications aircraft, the AOC's Canberra and a Hastings used by the CinC for rapid movement around their command which stretched from Bahrain to Nairobi. As an indication of the extent of the build up at Khormaksar, the average number of flying hours per month doubled between 1957 and 1959 to between 2,200 and 2,300. In one fortnightly period in 1959, including the twelve locally based types, twenty-five different military aircraft types were handled.

A major task for 5004 Squadron was at Beihan to stabilise the desert landing strip with a 6-inch thick soil and cement mix. This was done using a tractor-towed three-part machine known as a Howard Train which travelled at just 2 feet per minute, a marked contrast to the runway construction at Celle. The first unit mixed the water and cement in metered quantities the second unit spread the mix onto a strip of sand six feet wide and screeded it whilst the third unit compacted it. Due to the almost unbearable heat, copious amounts of water were required to ensure that the concrete cured at the correct rate. A well was sunk to provide the necessary water but this

drastically reduced the level in the wells supplying the local villagers causing a minor conflict. The job took ten months to complete and stood up well to use until it was further improved by 5004 Squadron some four years later. During the detachment, a crashed Beverley was removed by blowing it up into manageable pieces for the local Arabs to cart away.

### **Aden 1959 to 1964**

By May 1959 the work in and around Aden was very widespread and it had become too much for the detachment so a reorganisation took place. 5004 Squadron moved from the UK to Khormaksar where it absorbed the detached personnel of 5001 Squadron, plus some additional manpower drawn from the detachments at Akrotiri and El Adem. At the same time the headquarters of the reduced 5001 Squadron moved from Idris to Akrotiri. It is worth relating that during the period 1956 to 1959 the squadron's strength peaked at more than twenty officers and between 500 and 600 airmen. All but one of the civil engineer and M&E officers were either Short Service or National Service, as were the junior NCOs and airmen. The only 'full career' personnel were the warrant officers and SNCOs. Even the Squadron Commander throughout this period was on a Short Service Commission; Sqn Ldr D S (Derek) Little was only 26 years old when he was appointed to acting rank on taking over the squadron.

The CO appointed to take 5004 Squadron to Aden in April 1959 was Sqn Ldr Eamon St Brendan ('Bren') Kenny, one of the very few ACB officers on a permanent commission, who, having commanded 5001 Squadron in the Canal Zone and North Africa, was very familiar with operating in a desert environment. Again, one of the first tasks that had to be undertaken was to build its own technical accommodation, as the hurriedly erected tented accommodation was hardly the best environment for workshops and offices. This was done by recovering and re-erecting huts from a disused wartime camp and by the squadron's versatile carpenters adapting aero engine packing cases. These temporary constructions sufficed until time permitted the building of more permanent structures a few years later.

One of the first major undertakings was the construction of a temporary runway at Sharjah to enable the airfield to continue operations whilst civilian contractors refurbished the main runway.



*Sharjah – 1959.*

This involved scraping thousands of tons of gypsum laden sand from Sharjah Creek, spreading it on the runway area then levelling it and consolidating with sea water, finally rolling it to produce smooth surface. Ironically, the detachment commander who had had the task of dealing with the crashed Beverley at Beihaan whilst with 5001 Squadron, was the commander of the 5004 Squadron detachment which had to remove another aircraft – a PR Canberra that had suffered engine problems on take off and landed in Sharjah Creek.

During the 1959-60 monsoon season a hurricane swept through Salalah causing major structural damage to forty-eight of the fifty-two buildings on the camp and the rains, causing a river-like flow from the foothills, rendered the sand runway totally unusable. The runway was repaired quickly and, where feasible, buildings made safe by temporary repairs prior to a programme of rebuilding being set in place. Some two years later a similar violent storm washed away part of the road which was the only supply route from the camp to the port, leaving a twelve foot deep gash. A 5004 Squadron detachment soon made the road useable again.

The ACB returned to Beihaan, in the form of a 5004 Squadron detachment, to lengthen and strengthen the runway, which had been constructed earlier by 5001 Squadron. This involved the quarrying and crushing of 20,000 tons of stone for the sub-base of the runway. As always the searing heat was a problem but added to this were the constant troublesome visits by insurgents. However on 5 May 1961 the detachment proved quite capable of defending itself when it was

attacked by local tribesmen, disposing of two and wounding another. The camp was supposed to be guarded by the Federal National Guard but their effectiveness was thrown into doubt when ammunition was stolen from the Ferret armoured cars. In addition to the runway task, wells were sunk, roads constructed and even a mosque was built. The runway became the only up-country airstrip with an asphalt surface and in 1966 this permitted Hunters to fly in and stand guard against Yemeni intruders.

Concurrent with work at Beihan, the squadron was tasked with improving the facilities at the camps in the Protectorate on or near the Yemeni border: Dhala, Mukeiras, Lodar, Attaq and the route stations of Riyan, Salalah, Masirah and Sharjah. Dhala, in particular, posed logistical problems; as all heavy plant and materials had to be transported through the notorious Dhala Pass where insurgents were still regularly firing upon British convoys. Fortunately there were no casualties, although some damage was inflicted on vehicles and equipment.

Although the squadron's main customer was the RAF, it also did a lot of work for the Federal Republic Army, the British Army, including the SAS, the Aden Protectorate Levies, the Trucial Oman Scouts and the civil community. As the Radfan campaign progressed, personnel at the up-country army camps were reinforced and to make life a little more comfortable for the occupants, 5004 Squadron was tasked with improving the facilities. These ranged from building permanent dining halls to providing concrete bases for tents and installing and maintaining electrical systems for camp lighting and refrigeration.

5004 Squadron continued to provide support to units throughout the Aden Protectorate, around the southern edge of the Arabian Peninsula and up the western coast of the Gulf until 31 December 1964 when it handed over to 60 (Field) Regt, Royal Engineers and returned to the ACB Depot which, by now, had moved from Wellesbourne Mountford to Waterbeach in Cambridgeshire. 5004 Squadron disbanded there on 15 May 1965.

### **Middle and Far East 1959 to 1966**

In 1959, with the Suez Crisis, EOKA problems and the Iraq and Jordanian emergencies all in the past, 5001 Squadron settled down to a somewhat less hectic life at its new HQ at Akrotiri while still

maintaining a large detachment at El Adem.

Tasks undertaken by the squadron were largely for their training value but nevertheless had an impact on operations. In Cyprus a new Sergeants Mess was constructed at Troodos, not an easy task as all plant and materials had to be hauled up the mountain. An Operations Block for 280 Signals Unit at Cape Gata, a school and a Families Club at Akrotiri were also built. A novel task for what was primarily a 'warm climate' squadron was snow clearing, with bulldozers, in the Troodos Mountains to keep the road between Troodos and the radar station at Mount Olympus open. Personnel enjoyed the novelty of skiing on snow in the morning and water skiing off the beaches at Akrotiri in the afternoon.

At El Adem, the detachment took the opportunity to modernise the accommodation blocks, originally built by the Italians in the 1930s, and built a cold store for the Army garrison in Tobruk. Away from these domestic operations, in the autumn of 1961 the squadron took part in Exercise SATURN, a combined Army and RAF tactical field engineering exercise in Cyrenaica. Not only was the squadron tasked with repairing the Italian built runway on Derna airfield and constructing a temporary airstrip on the coast east of Derna, it was also tested on its ability to defend itself against an enemy attack. With the help of a little 'intelligence gathering' on the likely tactics of 'the enemy' the squadron acquitted itself well on its defensive posture as well as the construction work for which the heavy plant had to be brought from El Adem by road at just 7 mph, taking 15 hours to complete the journey.

In a similar exercise in 1962, emergency airstrips were constructed at Bomba on the Libyan coast and at Kufra, 600 miles into the desert south of Benghazi.

Other projects for the squadron were the training of Iranian Air Force personnel in the running and maintenance of power stations at Tabriz in North West Iran and Babolsar on the southern shore of the Caspian Sea.

A foretaste of what was in store for the squadron came in 1962 when a detachment was sent from Cyprus to Brunei when a rebellion broke out in the Sultanate. An airstrip was rapidly constructed and technical and domestic accommodation erected.





*Tawau – 1963.*

On 14 February 1963, a detachment of five officers and 90 men was deployed as part of the British reaction to Indonesian threats against Sarawak and North Borneo. On arrival in the Far East the detachment split into two, one part to Kuching, in Sarawak, the other to Labuan off the north west coast of Borneo close to Brunei. Both detachments were to improve the airfields' facilities in anticipation that the RAF would be required to deploy aircraft in the air defence role and to support ground troops should there be any incursion from Indonesia. The main tasks were to increase the hardstanding areas at Kuching airport and build a large camp to house RAF personnel at Labuan. Such was the size of the tasks in the area that the remainder of 5001 Squadron moved to Singapore in July 1963, bidding farewell to the Middle East after twelve years continuous service and settling in to its new home at Seletar.

Although there were frequent infringements of Malaysian airspace by Indonesian Air Force intruders during 1963, being about 100 miles from the border, the detachment at Labuan felt relatively safe from attack, and even more so when the occasional detachments of Hunters of No 20 Sqn from Singapore became a permanent presence from





*Locally-employed labour at  
Loeng Nok – not really.*

February 1964 onwards.<sup>1</sup>

Another major project was the development of an existing airstrip at Tawau in north east Borneo to create an additional airfield, together with technical and domestic sites.

By the autumn of 1963 the political tension in the Far East was rising and there was a heavy workload for the squadron on the main Singapore airfields at Tengah, Changi and Seletar. Typically, hardstandings were extended to accommodate extra aircraft while gun emplacements were built and trees felled to improve fields of fire. The detachments at Sarawak and Borneo continued concurrent with the work on Singapore and another

detachment was sent to Hulule in the Maldives. In December 1963 the plant element of 5001 Squadron joined an international force on Operation CROWN – the building of an airfield at Loeng Nok Tha in North Thailand for the Thai Government.

The airfield at Loeng Nok was built on behalf of the South East Asia Treaty Organisation (SEATO) and was by far the most uncomfortable task undertaken by the squadron in the Far East. The climate and terrain were both inhospitable, temperatures rising to 130°F and, when it wasn't raining, it was very dusty. All plant and materials had to be shipped from Singapore to Bangkok then transported 300 miles by road. The construction team comprised Australian and New Zealand engineers, two Royal Engineer squadrons and three other elements of the Army in addition to 5001 Squadron, nineteen different cap badges in all. In clearing the area before

<sup>1</sup> Labuan's F540 notes that, in the small hours of 2 February 1964 an Indonesian 'Badger' flew across the airfield at about 1,000 feet. It happened again a fortnight later, at 1104 hrs on the 16th, but this time at 20-25,000 feet. This led to the establishment of a Borneo/Sarawak ADIZ on 25 February – hence the permanent presence of Hunters, and Javelins. **Ed**

construction could begin 500,000 cubic yards of soil and gravel had to be moved. Wells were sunk to provide the daily water requirement of 45,000 gallons for construction and 25,000 gallons for domestic purposes. The end result was a fully serviceable airfield with a 5,000 × 120 feet runway and 140,000 square yards of apron. This was all formally handed over to the Thai Minister of Defence on 17 June 1965.

What transpired to be the final major task undertaken by 5001 Squadron, reinforced again by personnel from 5003 Squadron in UK, was at the Royal Malaysian Air Force flying training base at Alor Star in the north of Malaysia. This was a designated war zone and all personnel were given extra weapon training. There was also the threat of meeting the occasional tiger, so the working and living areas of the camp were permanently patrolled by armed guards. Here the squadron reinforced the runway and taxiways with four inches of concrete to make the base suitable for the operation of heavier aircraft. This task was completed on time in November 1964.

It was around this time that it was announced that the ACB would be disbanded within the next five years. In practice this period reduced to just 15 months. It came as a shock to 5003 Squadron's personnel, therefore, when, on returning to Waterbeach from Alor Star, they found an advance party of sappers already in residence preparing to take it over.

Back in FEAF the impending demise of the Branch didn't affect any of 5001 Squadron's many and varied tasks during 1965, culminating in December of that year with an urgent requirement to prepare facilities at Kuching to support a detachment of Javelins. The task was completed ahead of time. This was 5001 Squadron's swan song for on 12 February 1966 responsibility for engineering support on RAF airfields in FEAF passed to 51 Squadron, Royal Engineers.

On 31 March 1966, 5001 Squadron paraded at Seletar for the last time, AVM I G Spencer, Air Officer Administration FEAF, taking the salute. This was a sad but splendid occasion witnessed by friends and families. Fittingly, in the background some of the squadron's plant was lined up along with Beverley aircraft which had served the ACB so well in all theatres and without which many of its tasks could not have been performed.



*The penultimate parade – Seletar – 31 March 1966.*

On 1 April 1966, a few hours after this parade had taken place, a much lower key affair took place at Waterbeach when sixty airmen of the ACB, together with a similar number of Royal Engineers, were on parade, marching to a military band, in front of civic dignitaries, military officers and proud families before the RAF Ensign was lowered for the last time, marking the closure of RAF Waterbeach and the disbandment of the Airfield Construction Branch.

#### **Notes**

Sources consulted for this section of the Presentation included:

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## MORNING DISCUSSION PERIOD

**Wg Cdr Jeff Jefford.** Could you expand a little on the overlap between the AMWD and the Airfield Construction Branch? Who did what, when – and who decided?

**AVM John Browne.** It depends, to a degree, on the period. In the early days AMWD did *all* the work, apart from within war zones. When the RAF Works Service was formed it worked, broadly speaking *for* the AMWD with individual Works Flights either specifically repairing bomb damage or carrying out other maintenance tasks around their parent station. The Service was always heavily dependent on AMWD for resources; indeed in the beginning it had absolutely no resources of its own, other than what it could beg, borrow or steal – perhaps I should say ‘acquire’ – and, although the Service was progressively equipped with its own tools and plant, it remained dependent on AMWD for materials at home. On the other hand, in early post-war Germany the Airfield Construction Service/Branch managed everything – design, contracting, supervision – via its wings, with two of them after 1947, one in the north and one in the south. Most of the actual work was carried out by local German contractors or locally recruited directly employed labour. Starting in 1957, responsibility for this was progressively transferred to AMWD along with a number of the longer serving personnel from the wings.

From then on, it rather depended upon *where* you were. In the UK, when the ACB sent a detachment to a station it worked for the station’s resident AMWD Superintending Engineer and when the job was finished the Detachment Commander had to get the Superintendant’s signature on a document certifying that the work had been completed to his satisfaction. I recall that the first time I was detached in charge of a team I was told not to come back until I had that piece of paper in my hand. That was the brief – and I think that it shows the pecking order.

**Sqn Ldr John Fox.** I can expand on that a little. I recall that, when I was in Aden, a BBC reporter asked that very same question of my CO, Sqn Ldr ‘Bren’ Kenny. It caught him off guard and he said, ‘We do the jobs that AMWD don’t want to do.’ (*Laughter*). He got his knuckles rapped for that!

**Sir Frederick Sowrey.** What about, what we might term, ‘Research and Development’? For major projects you would have been able to draw on civil engineering practice but what about ‘tactical’ situations in more remote locations? We have heard, for instance, about an incident at Salalah – someone had to decide whether to mix sand with sea water or diesel oil. Was that simply a judgement call by the man on the spot or would advice have been sought from the UK?

**Browne.** The AMWD did have laboratories – quite a big one at Cardington. They did a lot of basic research, and there was a lot going on elsewhere within the industry. Away from the UK, you were pretty much on your own and you based your decisions on experience, common sense and whatever advice or information you could find. The Royal Engineers, for instance, published a series of very useful handbooks dealing with many aspects of practical civil engineering – from how to build things to how to knock them down. A set of those on your bookshelf could be very useful because, over the years, the REs had had to solve many problems and their solutions had been carefully documented – so they made good reading.

It is probably also fair to say that some research was done in the field. We had, for instance, mobile laboratories that were mainly interested in soil mechanics. I should also acknowledge that some of our corporal technicians were quite clever people and they came up with some good ideas too.

**Mike Meech.** Some mention was made of skilled labour during the war. Was there ever a shortage? Or did the ACB have some form of priority for manpower? What about plant? That must have been in fairly short supply too. I wouldn’t have thought that the pre-war national stock would have handled the wartime airfield construction programme. Did that involve a lot of imported American equipment? – and, again, did the ACS have any priority in accessing this kit?

**Browne.** So far as skilled labour was concerned, the Royal Engineers had pretty much drained the national pool before we even existed. As a result, we were on the back foot from the outset. Indeed, the ACS was criticised, more than once, for being under-officered by normal military standards. That was true, but it was simply because we had real difficulty recruiting suitable people. We certainly did not have

any form of priority. That said, to be fair, once the ACS had been formed, I don't think that the REs had priority either – it was a free for all.

Plant? A good deal of engineering plant was imported under Lend-Lease and, because the ACS was heavily involved in the airfield building programme – by the end of the war East Anglia was virtually one big airfield – it did have a prior claim on some of this kit. We certainly got a lot more of it than the Royal Engineers did. That was one of the reasons why the ACS heavy wings on the Continent were so much bigger than their RE equivalents. It is interesting to note that two-thirds of the airfield construction personnel on the Continent were RAF, although the whole business was actually being run, at the top level, by the Army.

**Desmond Goch.** I'd like to pick up on a point that AVM Browne has just made – the enormous extent of the airfield building programme in WW II which is not, I think, fully appreciated today. Many stations had been built for Bomber Command during the 1930s but when it continued to expand during the war many more were needed and from, probably, 1941 onwards they were built, very rapidly. Right across Yorkshire and Lincolnshire and on down into East Anglia airfields simply mushroomed. They were built to a wartime austerity standard, of course – hangars were generally pre-fabricated sheds, not the splendid permanent structures of the 1930s, and domestic accommodation was in Nissen huts sited in a sea of mud. The focus had to be on the provision of the facilities that were essential to sustain operations – which meant runways, taxiways, dispersals, fuel storage and bomb dumps. It really was a major undertaking. I'm not familiar with exactly how it was done, but it must have involved major civil engineering firms, like McAlpine, Wimpey and Laing. The sheer scale of the programme must have had a significant impact on the economics of the conduct of the Second World War and I don't think that this has had the degree of recognition that it really deserves.

**Browne.** Seb Cox, the Head of AHB, has done some work on this. He attended our annual dinner a few years ago and we got him to sing for his supper by presenting some of his findings, which included some figures on the wartime civil engineering effort. Rather than my trying to recall what he said, I think that I still have a copy of his paper

which I will endeavour to send on to you. (*Mr Cox subsequently provided a copy of his paper for publication – see page 142. Ed*).

**Richard Bateson.** When we captured enemy airfields on the Continent, did we discover any novel construction features? Had autobahn building techniques been used? Did the *Luftwaffe* have an equivalent to SMT or PSP?

**Browne.** A lot of them were grass, of course – as they were in this country at the beginning of the war. I'm not entirely sure how the Germans made their runways, but it will probably have involved concrete. In some areas, particularly in the Netherlands, a lot of it was done in brick, simply because it was a material that was readily available locally – lots of brickworks, not much cement – and they knew how to build roads in brick – and they still do. Eindhoven, for instance, one brick runway. It was not entirely satisfactory – because brick pavements don't like standing water.

Runway repair? It was pretty rough and ready. With frequent attacks, there was no time to dig neat holes and back-fill with concrete. More a question of digging out the worst of the rubbish, replacing it with better rubbish and rolling it flat.

**R C Lambert.** Reference has been made to the relative scarcity of qualified officers to lead the ACS. That being the case, how were design issues handled for the larger construction schemes?

**Browne.** It depended on where you were. In early post-war Germany the wings did have Civil Engineering Officers on their staffs. In this country AMWD also had very experienced design teams. Unfortunately AMWD acquired a rather poor reputation after the war, because down at the coal face they tended to be judged on the speed with which they replaced a washer on the tap that was dripping in your married quarter. That was pretty superficial stuff, of course, and the more serious elements of AMWD, the people who managed the big construction projects were a totally different bunch. That was true as far back as the 1930s and the relatively small group who oversaw the building of the 'expansion era' airfields did a first class job. After all, most of the buildings on those stations are still standing. Those that aren't have been knocked down; they didn't fall down, and you can't say that about a lot of the other buildings that were put up in the

1930s. So I would fly a flag for the Air Ministry and its Directorate of Works. They were serious civil engineers and they did a great deal of first class work. What they didn't do themselves was contracted out to firms of consulting engineers, which was then, as now, a fairly standard procedure.

**Frank Angus.** I was in North Africa in 1942 – Operation TORCH – and there has been no mention of that campaign thus far. I raise this because at Souk-el-Arba the ground became so waterlogged that the runway was lined with cork bark and it became known as the floating runway. One pilot was said to have complained of sea sickness. (*Laughter*).

**Stephen Mason.** Were any decorations awarded to men in the field force?

**Browne.** I'm glad you asked that. It has always bothered me a bit. 'Daddy' Dow, who was the lynch pin of the whole business throughout the war, and later – he was in the Far East when the ACS



*Sqn Ldr Wally Lenton.*

went into Hong Kong and Singapore – he was always thinking a year and a half further ahead than anyone else – was made an OBE and you might consider that that could have been a bit higher. Then there was Sqn Ldr Wally Lenton, who was our man at Gatow throughout the Berlin Airlift. The Gatow runway had not been built to withstand a movement every 90 seconds, of course, and by the end of the airlift it was pretty comprehensively broken. They could only work on it for about an hour in the small hours of the morning, just time to find the largest potholes, fill them with hot blacktop and tamp it down before flying resumed. Wally's considerable contribution to success was recognised, albeit somewhat belatedly, when, by then an acting squadron leader, he was appointed as an MBE in January 1953. A handful of men were honoured, and they



all had campaign medals of course, but honours certainly weren't handed out to the ACS by the bucketful – they had blacktop by the bucketful – but not gongs.

**Margaret Fricker.** After the fall of Singapore and Hong Kong in 1942, did the ACS have a remit to destroy airfields to prevent their use by the Japanese, which would be difficult, I imagine, or could anyone do it?

**Browne.** That was more in the terms of reference of the Royal Engineers and they did, for instance, have a go at the railway tunnels in Hong Kong. The ACS was not in the Far East at that stage. There had been plans to send some units out there but, perhaps fortunately, they did not arrive in time. Had they done so they would probably have been taken prisoner before they could have done anything constructive – or even destructive.

**AVM Nigel Baldwin.** There was a major programme in the 1950s to create the airfields for the V-Force – runways 9,000 feet long and 150 feet wide with very substantial foundations. That was presumably done by civil engineering firms under contract, rather than by the ACB – or was it?

**Browne.** There was some involvement, in that a number of ACB officers were working with AMWD at the time. For instance, I know that Brian Corbett, the member of our team who isn't actually here today, was involved in the reconstruction of both Gaydon and Wittering. The ACB was a relatively small organisation by then, of course. When I joined in 1958 we weren't really in the heavy engineering business any more. We were only about 800-strong, world-wide, by then, which was a marked reduction on the 30,000 we had had in 1944.

**Fox.** I can add a bit to that. I can confirm that Brian Corbett was involved at Gaydon and Wittering but they were working on ancillary facilities, like hardstandings and wash areas, not the runways.

## RAF REGIMENT ANTI-AIRCRAFT (AA) DEFENCE WWII TO BELIZE

### Air Cdre Mickey Witherow



*Commissioned into the RAF Regiment in 1956, Mickey Witherow's service included stints in Aden, the Gulf, Libya, Belize and Germany. He commanded No 26 Sqn, No 3 Wg, the Regiment Depot at Catterick and, having attended the Air Warfare Course in 1976, in 1983 he was the first Regiment officer to attend the RCDS. Staff appointments included tours at Ramstein and Rheindahlen, and as Director of Personnel (Ground) and Director RAF Regiment. After leaving the RAF in 1990 he joined Coutts Consulting Group, retiring as its Director of Information Technology in 2001.*

### Introduction

To set the scene, I need to reach back to 1940 because, when the RAF Regiment was created in 1942, it incorporated all of the RAF's new 'Ground Gunner' tradesmen (known as 'GGs') who had fought the RAF's AA war from the fall of France onwards. With the formation of the Regiment, the 'ground' was dropped and, regardless of how they were actually employed, the generic term for all RAF Regiment airmen became 'gunner', as it still is today. This brief glossary of the evolving AA jargon may also help:



*The trade badge worn on the sleeve by RAF Ground Gunners*

AA or 'Ack-Ack'

LAA

LLAD

SHORAD

GBAD

Anti-Aircraft

Light Anti-Aircraft

Low-Level Air Defence

Short-Range Air Defence

Ground-Based Air Defence

NB: The last two acronyms were often associated, where appropriate, with 'Guns', Surface-to-Air Guided Weapons (SAGW) or, later,

Surface-to-Air Missiles (SAM) as short-range missiles entered the inventory from 1967 onwards. The operating envelope was defined as a short range air defence engagement zone (SHORADEZ) extending to 12,000 ft altitude and a 6 km horizontal radius.

## Policy

Prior to the German *Blitzkrieg* in Western Europe in 1940, it was assumed that the Army would defend RAF installations against a major attack launched at or near ground-level, even though in 1938 Gp Capt J C Slessor had written to the DCAS saying that the RAF needed its own AA defences, arguing that if money or manpower was inhibiting the acquisition of AA guns, we should cut bombers, because:

‘It’s better to start the war with 800 bombers operating from reasonably secure bases than with 1,000 bombers, of whom perhaps more than half will be unable to operate because their aerodromes have been put out of action. I think we should order some Bofors for our most exposed aerodromes....’<sup>1</sup>

In the event, the RAF did not order the guns; the Army was incapable of defending the RAF and the RAF in France was largely destroyed on the ground. Lacking air support, among many other factors of course, the Army was also defeated. The only support available for the Army, entrapped at Dunkirk, Boulogne and Calais, was provided by air forces operating from the relatively secure UK mainland.

In 1937, the War Office had ordered from Bofors AG of Sweden a total of 650 of their new (1936 model) 40mm L60 AA guns, to be delivered by 1940. Most of these went to France with the BEF and were lost. Thus, after Dunkirk, the Army had only 108 Bofors guns remaining. Although the priority tasks were defence of the homeland and the field army, some were assigned to airfields.

Meanwhile, post-Dunkirk, and in the absence of any alternative, every RAF airfield bristled with light automatic weapons along with the new Parachute and Cable (PAC) AA weapon system and a new Ground Defence Branch was created to provide and organise the

<sup>1</sup> Memorandum from DDAir Plans to DCAS in 1938, quoted in Kingsley Oliver’s *Through Adversity – The History of the RAF Regiment*, p17.

necessary manpower. To begin with, Army and RAF personnel, of any arm or trade, were assigned to man these weapons, until sufficient numbers of GGs became available.

Despite heroism in action, and some notable individual successes, the RAF's miscellany of light weapons, mostly of 0.303" calibre, with an effective range of only a few hundred yards, and without a properly organised command and control system, was largely ineffective as a serious defence mechanism.

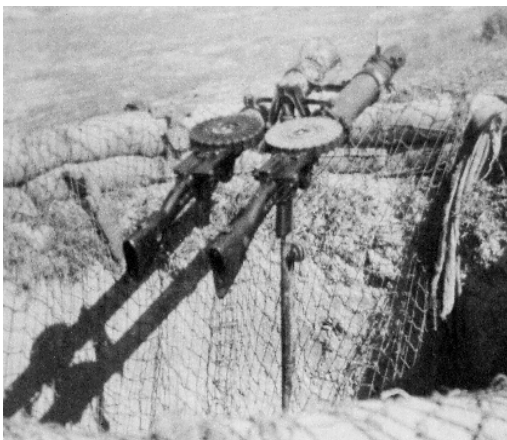
### **Early Combat and an RAF 'First'**

For our Society's Proceedings, it is worth recording an RAF 'first', in that three of the first four Military Medals ever to be won on British soil were won by RAF ground gunners, the fourth by a Scots Guardsman, all in defence of RAF airfields on 18 August 1940 and all within a very short span of time. The occasion was a very low-level *Blitz* attack by several waves of enemy bombers against airfields in south east England. Two Dornier 17s were brought down at Kenley, by AC2 D G Roberts (ground gunner) and L/Cpl J Miller (Scots Guards); another at Detling by Cpl B Jackman (ground gunner), who was severely wounded in the process, and one at Biggin Hill by Sgt R Cunningham (also a ground gunner). Whilst two of these and the guardsman were using twin Lewis guns, Roberts, who was still under basic training as a PAC operator, broke cover and under heavy fire single-handedly launched a nine-cable PAC barrage. This engaged the first aircraft, but the pilot shed it before it cut into the wing. The second aircraft was destroyed, with its crew. The pilot of the third banked sharply to evade the PAC, only to fly into the coverage of a Bofors gun, which set it on fire. L/Cpl Miller's action was separate, but parallel, at about the same time.

Extraordinarily, Gp Capt David Roberts MM, (who was also Mentioned in Despatches in Cyprus as a wing commander in 1965) and Major John Miller MM, Scots Guards, having won their gallantry decorations within moments of each other in the same battle on the same airfield, died within a few days of each other in early 2001. David Roberts's obituary appeared in *The Times* and Miller's in *The Daily Telegraph* about a week apart.

### **North Africa**

In North Africa RAF AA defence was linked to the flying



*A typical AA position in North Africa, a pair of Lewis guns in one of the sandbagged gun pits dug at a succession of desert landing grounds by the ground gunners of No 45 Sqn.*

squadrons, rather than to airfields; a logical arrangement for a tactical air force in a war of much movement, operating from often improvised desert strips. Apart from the usual array of light automatic weapons, Hispano 20mm aircraft cannon, adapted for ground use, were issued. These were all relatively short-range weapons, but a considerable advance on small-arms and readily re-deployable. The guns were loosely grouped

into *ad-hoc* flights, often without an officer and, as a result, discipline tended to be slack and training indifferent. Nevertheless, in that theatre the unobstructed desert horizon and largely clear weather simplified AA gunnery and thus taught no real lessons in the complexities of AA combat. The gun-crews, with an observer, would look out for hostile aircraft, which could often be detected at a considerable distance, and open fire when they simply judged the range to be right.

Without disparaging the courage of the men who fought such actions, often very bravely, it does illustrate why so many in the RAF, held a simplistic view that low-level AA gunnery was something akin to driven-pheasant shooting – the ‘bird’ was spotted from the gun-position; an alert was given and the nearest guns fired as it came over. That may have worked for a Fokker Triplane, but to expect the same degree of success against a 300 mph fighter-bomber was a different proposition. Nevertheless, that is exactly how it was done and, because of some notable successes, to some degree it remained a prevalent view in the RAF for many years, long after the war was over.



*A 40mm Bofors L60 at Foggia, Italy.*

Matters were seriously different when the action moved to the northern Mediterranean, especially in Italy and the Dodecanese Islands, and to South-East Asia, notably Burma, where the role of AA has not, to my knowledge, so far been addressed in this forum.

### **North Mediterranean**

Those who attended the Society's 2009 North Mediterranean day, or who have read the Proceedings, may recall that the RAF Regiment's LAA units (by now organised as squadrons) ran into unforeseen problems as soon as they landed in Sicily in 1943. Non-self-destructing 20mm rounds were falling on nearby airfields and positions manned by British troops, which led to hurriedly contrived taboo arcs being imposed on the guns. These were immediately exploited by the enemy at the cost, to us, of far more casualties and aircraft destroyed on the ground. Moreover, the combination of variable weather and mountainous approaches gave excellent cover to stealthy attackers until it was too late for the guns to react. As a result, Control and Reporting (C&R) flights were established. Deployed up

to 3,000 yards forward of the guns, and provided with radios, they were able to warn gun crews, Air Ops Centres and Air Traffic Control of approaching aircraft.

However, with some bases hosting several LAA squadrons, it became necessary to establish a single higher-level of tactical command to co-ordinate their efforts. So the RAF Regiment Wing HQ was created to control up to four squadrons. This permitted the standardisation of training, battle drills and procedures, and allowed a single C&R flight of 36 men to serve an entire wing of guns, in place of the 144 men that would have been required by the individual units.

Thanks to these changes, 'blue on blue' incidents were sharply reduced. The situation was further improved in 1944 when RAF units in Italy began to receive the first Bofors L60 guns. These fired powerful, self-destructing ammunition and had a substantially improved effective range of 850 yards, compared to the 300 yards of the Hispanos. Thus the RAF built a very capable anti-aircraft force as the Allies advanced through Italy.

If, today, this total dependency upon a learning process gained in battle sounds like a shambolic way to run a war, it should be remembered that engagements between the ground elements of mobile tactical air forces in the field and high-speed enemy aircraft had never been experienced by any nation until our Desert Air Force took on the Axis air forces. The RAF learned well from these hard lessons.

### **South-East Asia**

In parallel to all this, a third scenario was emerging in South East Asia, where the Allied decision to prioritise the Hitler threat had inevitably led to the impoverishment of Imperial Forces in the theatre of the 'Forgotten War'. Thus it was that only two infantry divisions, intended and equipped only for the internal security of Burma in peacetime, were in the country when the Japanese invaded. There was no formalised AA plan or equipment in place. Thus, many of the few RAF aircraft that were available, mainly at Mingaladon, near Rangoon, were lost on the ground to enemy counter-air attacks very early on. Those that remained were withdrawn to Magwe where, again, most were destroyed on the ground. The miscellany of improvised light AA weapons, without trained men, was quite useless.

A subsequent report by the RAF's Inspector of Ground Defence,

Air Cdre (later Air Chf Mshl Sir) Arthur Saunders, exposed an almost total lack of planning or even consideration of the subject, despite directives from the Air Ministry. The RAF in theatre had simply said that it was the Army's responsibility. As a result of the Saunders Report, Air HQ India moved swiftly and in late 1942, a Wing Commander Jack Harris (later to become the first RAF Regiment air vice-marshal and Commandant-General), who had been the Inspector's Ground Defence Adviser in London, was appointed as Command Defence Officer. Since Harris had been an infantry officer and then an RAF pilot in the First World War, his background was ideal. He was a most forceful personality and had an immediate impact upon the scene. However, even the AOCinC India was unable to acquire all of the weapons and manpower that was needed, as priority was still being given to Europe.

When the RAF Regiment first arrived in Burma from training in India at about the same time as Jack Harris, the North Africa pattern of independent AA flights attached to flying squadrons had been adopted. They were soon reorganised into squadrons, with a few independent flights (by now with an officer in command) assigned to protect small but vital ground facilities, such as radar and communications sites. Nevertheless, these so-called 'India squadrons' were established with fewer men than the units in other theatres because they had no C&R system and were equipped only with twin-barrelled Browning 0.303" light machine-guns. Only in June 1944 did they eventually receive 20mm Hispanos, but still without a C&R establishment. They therefore relied upon the gun-crew reacting as per the original desert units – an almost useless procedure in mountainous jungle terrain. Even in open country, the often extremely wet conditions created by monsoon downpours could severely limit the disposition of guns, detracting from coverage of the defended installation.

I have found no evidence of any properly established Control and Reporting system ever appearing among the SEAC AA squadrons, nor have I found an explanation for this deficiency, despite the success of this innovation in Italy and elsewhere. It could be that isolated three-man Observation Posts (OP) were simply too vulnerable to Japanese Special Operations troops, whom the RAF Regiment frequently fought, often well behind our own lines – insofar as any 'line' was





*A 20mm Hispano at an airstrip in Burma.*

ever discernible.

It could also have been that the topography simply rendered OPs impractical. Whatever the reason, the absence of tactical C&R was massively detrimental to AA artillery because the attackers were often not seen until they had released their weapons and then only for a second or so.

The RAF Regiment in SEAC never received Bofors guns, the only theatre to be denied them, although the Indian Army was equipped with them from the start of 14th Army's final counter-offensive.

Nevertheless, the SEAC AA units always had amazingly high morale and they fought as many ground engagements as air defence ones. Rather surprisingly, we have an accurate tally of ground-to-air success by SEAC RAF LAA weapons throughout the war, both pre- and post- the Regiment's arrival. These records reveal that guns of 0.303" calibre destroyed three aircraft and damaged three; 20mm Hispanos destroyed only one and damaged six. Of course, the LMG defences had fought twice as long a campaign as the Hispanos, at the height of Japanese air capability and had thus had more targets to



*A Beaverette Mk I. The Mk III had a more substantial turret mounting, for AA purposes, a pair of 0.303" Vickers 'K's.*

engage. Nevertheless, it was a disappointing tally for all the hardships that had been endured and casualties sustained, from enemy action and tropical diseases alike.

### **Home Defence, D-Day and NW Europe**

Returning to the UK and NW Europe, the RAF Regiment was initially established in 1942 with no fewer than 106 LAA squadrons for deployment in the UK alone. Early in 1943 RAF Regiment Hispano squadrons were deployed for the defence of many coastal towns from Ramsgate to Exmouth. They were supplemented by 174 Beaverette armoured cars, each mounting a pair of Vickers 0.303" machine-guns, which were part of Fighter Command's twenty-nine RAF Regiment Field Squadrons, which could now be released from immediate anti-invasion readiness on the airfields.

Most of these coastal defence squadrons had some AA success during this phase, largely due to improved communications for control



*An RAF Regt Bofors site in the gun belt deployed to protect London from the V1s in the summer of 1944.*

and reporting, linked in to the national early warning system. Surprisingly, one of the armoured car flights (of six cars) shot down six enemy aircraft raiding Torquay on 30 May 1943. In consequence, four additional mobile LAA squadrons were immediately formed, using soft-skinned vehicles mounting multiple Browning machine-guns, although there is no evidence of a repeat performance. These vehicles became known as the Regiment's 'Flak-wagons'.

In 1944, immediately before Operation OVERLORD, the Regiment in the UK at last received 40mm Bofors L60 guns. Shortly after D-Day, the flying-bomb offensive against London got under way and thirty-one LAA squadrons were deployed along the south-east coast between Folkestone and Beachy Head, with a further twenty-one being added at the end of July to cover the Thames estuary. The RAF thus contributed more than 600 Bofors guns to Operation DIVER, the campaign to counter the V1s, in addition to some 800 of the Royal Artillery. With targets approaching on a steady trajectory at a



*This relatively familiar, but sometimes inaccurately captioned, picture, is of RAF personnel examining the wreckage of an Me 262, WNr 170122, flown by Hptm Rudolf Roesch of 3./KG51, which was shot down near Helmond by No 2875 Sqn on 28 November 1944.*

consistent, relatively low altitude, albeit at unprecedented speed, the guns of both Services were extremely successful.

Meanwhile, twenty-five Regiment LAA squadrons participated in OVERLORD. Two wing HQs and three LAA squadrons had sailed on D-Day, although beachhead congestion delayed their disembarkation at 'Juno' beach until D+1. As they advanced into the Low Countries, the LAA units saw much action, most notably on 28 November 1944, when No 2875 Sqn shot down a Me 262 at Helmond, the first jet aircraft ever to be destroyed by ground fire.<sup>2</sup> On 17 and 18 December,

<sup>2</sup> This incident (and the photograph) has sometimes been confused with another which had occurred on 26 November when No 2875 Sqn had fired on an Me 262 and been credited with having damaged it. It seems likely that it had actually shot it down, as an Me 262, WNr 170120 flown by Uffz Horst Sanio of 2./KG51, for which no other claims were submitted, crashed in German-held territory at Wildenborch that day. **Ed**

when eighteen Me 262s attacked Helmond airfield, Nos 2875 and 2873 LAA Sqns destroyed two more and damaged several others. Another two were shot down by No 2809 LAA Sqn over Volkel in February and April 1945.

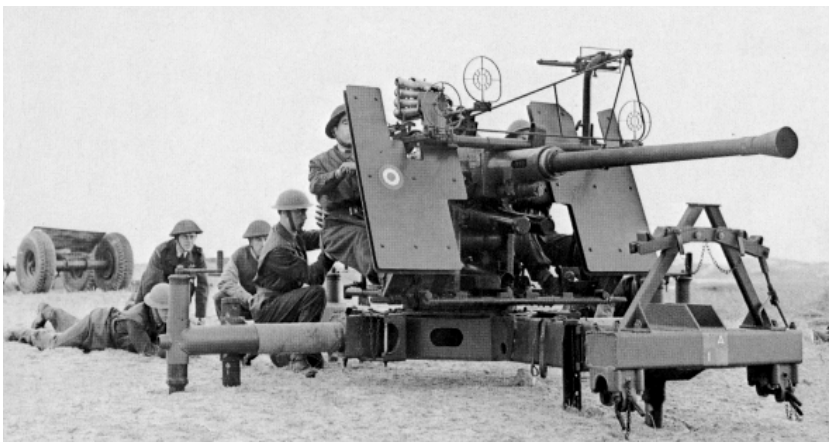
In the meantime, on 1 January 1945, the *Luftwaffe* had launched its famous ‘last fling’ attack, launching more than 700 aircraft. Of these, 335 sorties were flown against eleven RAF-occupied airfields defended by the Regiment, whose squadrons shot down 46 aircraft and damaged 42 more. A sergeant and an LAC were awarded Military Medals for their actions on that day.

These AA units were also successful in ground-to-ground operations. Unlike its predecessors, the 40mm Bofors had an armour-piercing round (up to 2½ inches penetration) in addition to its HE round. Moreover it could be depressed and fired considerably below the horizontal and could even be fired, with a very brief halt drill, whilst en-route, against air or ground targets. It was thus a very potent direct-fire ground-to-ground weapon, using either HE or AP rounds. This capability was used more than once on the Continent when RAF Regiment units, moving ahead of the Army to capture aircraft, radar sites and airfields, ran into enemy ‘stay behind’ ambushes.

### **Post-War**

With the emergence of the Cold War in 1947 all the main RAF bases in Germany had a wing of at least two LAA squadrons. Other AA units, all by now Bofors-equipped, were in our overseas areas of responsibility, notably Palestine, Iraq, Jordan, Egypt and later, Cyprus. In Palestine in 1947, a few engagements occurred against surprise Egyptian incursions and one Egyptian aircraft was brought down by an RAF Regiment Bren-gun. Korea did not affect the Regiment’s deployments, since no RAF squadrons operated there from land bases. Other conflicts continued in Malaya, Kenya, the Aden Protectorate and Cyprus throughout the 1950s, but with no enemy air threat, apart from the Suez campaign in 1956. Suez made Cyprus vulnerable to an attack from Egypt, but that risk was rapidly eliminated by Anglo-French counter-air action as soon as hostilities broke out.

With the passage of time, the numbers of officers and men who had actually experienced AA operations during the war declined and there were serious signs of disillusionment with the concept of



*A Bofors L60 in Germany in 1950.*

traditional AA artillery. All the talk was now of ICBMs and nuclear war. Post-Suez, in 1957, the 'Sandys Axe' reinforced this scepticism by anticipating even the imminent supersession of manned aircraft by missiles. As a result, the RAF Regiment in Germany was disbanded and the RAF's order for Thunderbird, the Army's semi-mobile equivalent to Bloodhound, which it had previously been announced would also equip the RAF Regiment, was cancelled. The LAA units in the Near East, apart from three wings in Cyprus, were disbanded. On the plus side, the Cyprus units, plus two LAA squadrons in the UK (retained primarily as a home-posting to sustain the gunnery skills of officers and men as they rotated between home and overseas appointments) received the new power-operated 40mm Bofors L70 gun. This weapon had twice the potential of the earlier L60 in every significant regard. It had an effective range of 2,400 yards, a muzzle-velocity of 3,395 fps (one of the highest velocities in land service at the time) and a rate of fire of 240 HE or AP rounds per minute. Nevertheless, the RAF's scepticism about guns still prevailed, even within the Regiment. Then, like an Angel of Mercy, Soekarno came to the rescue in 1963 when he launched his 'Confrontation' with the newly constituted Malaysia (initially including Singapore).

Hundreds of RAF Regiment personnel were hurriedly trained in AA gunnery and a squadron of RAF Regiment guns was deployed on each of the three main bases in Malaya and Singapore, two taken from



*While main air bases were protected by the Bofors of the RAF Regt and the Royal Artillery during 'Confrontation' in 1964-66, more remote sites were provided with ex-RN 20mm Oerlikons which were manned on a self-help basis by RAF personnel. This one was at Bukit Gombak on Singapore island.*

Cyprus and one from El Adem, in Libya. These were supplemented by two Royal Artillery batteries simply because the RAF had no further resources available. The combined force was under RAF Regiment command at each base. For a period of twenty-three months the guns and their observation posts were manned continuously for 24hrs a day, seven days a week; the longest stand-to on record for British LAA since the Second World War. Additionally, obsolete 20mm Oerlikons, drawn from Royal Navy stocks, were installed at more remote airfields and radar units in both Eastern and Western Malaysia where they were to be locally manned by the units' own non-Regiment personnel – it

was 1940 all over again!

In 1967, following the ending of Confrontation in 1966, the Bofors squadrons were brought back to the UK and earmarked for the strategic reinforcement of Cyprus, which still had a resident wing of two squadrons plus equipment for a third, and El Adem, where two squadron's worth of guns and equipment were maintained ready for rapid deployment upon arrival of the necessary fully trained manpower from the UK. These contingencies were frequently exercised in-theatre. By now the term 'LAA' had been superseded by 'LLAD'. However, RAF guns had still never fired in anger post-



*A Bofors L70, left, and a Tigercat launcher, right;  
both at Belize in the 1970s.*

Palestine.

Meanwhile the first mobile short-range SAGW system, the American Mauler project, which had been added to the RAF's shopping list in 1959, was cancelled because it fell far short of its specification. But with 'Third World' air forces becoming increasingly potent, an air-portable low level SAM was becoming essential. The Vickers ET 316, later to become Rapier, was the favoured system, but it was still a long way off.

As a short-term measure, the naval Seacat missile was adapted for land service. In 1965 this entered service with a single RAF Regiment squadron as Tigercat, the world's first fully air-portable SAM system. Since it was a unique weapon, it was a logistic nightmare, although it was a very successful sales-demonstrator for Short Brothers and Harland and the RAF Regiment trained, among several others, the Argentinean Air Force in its use.

Then, utterly unexpectedly, Tigercat was deployed operationally to British Honduras (now Belize) in July 1971, when Guatemala resurrected an historic claim to the British colony. Its air-portability made it the only effective LLAD system in the world that could be moved so far so swiftly. However, the Organisation of American States (OAS) shrieked hysterically at the introduction of missiles into the Caribbean so soon after the Cuban missile crisis. This was a ridiculous comparison, of course, but the UK conceded and three new Bofors L70 squadrons were formed to supplant Tigercat and to sustain a rotation there for the next seven years until Rapier took over.



However, the local topography rendered a fully effective AA gun deployment almost impossible because the swamps and jungle created considerable gaps in coverage. Consequently, the Tigercat squadron, now back in the UK was maintained at short-notice to redploy. In July 1977 a Guatemalan offensive was again anticipated and Tigercat, with its far longer range and much lighter 'footprint' than the Bofors, was rushed out to supplement the guns and fill the gaps. It remained in-theatre until late in 1978, creating a very capable weapons-mix. This time the OAS did not raise a peep – and the Guatemalans never came.

No 3 Wing, commanding the three Belize Bofors squadrons and Tigercat, was the last regular unit in the British Forces to be equipped with anti-aircraft guns. In RAF Germany, however, the Command's superseded guns were retained, notionally to be manned by station personnel in an emergency. The Bofors L70 was a potentially suicidal device in the hands of an amateur and untrained operators could not possibly have fought a contemporary anti-aircraft battle using such a weapon. Moreover, there were no dedicated communications links and no published battle-procedures. The ammunition was no longer an RAF stock-item, nor were there any ordnance spares. TACEVAL may have been bamboozled, but the Warsaw Pact certainly would not have been.

In 1978, the guns and Tigercat at Belize were both replaced by Rapier, which remained there until British Forces withdrew in 1990 by which time the Regiment had been providing continuous SHORAD cover for nineteen years. During this time, the Falklands War broke out, this time involving an enemy air force that represented a real threat. A Royal Artillery Rapier battery went initially, to cover the landings. The RAF was to follow-up to defend airfields as they were taken, but it had first to extricate itself from its existing operational commitments in Belize and Germany, the latter requiring SACEUR's acquiescence. In the event, No 63 Sqn RAF Regiment from Gütersloh sailed with the 5th Brigade (a story in its own right!) but arrived too late to participate in the action.

Although they never engaged in battle, No 63 Sqn did acquire a squadron's worth of Argentinean twin-barrelled 35mm Oerlikon guns, complete with their Skyguard fire-control systems. It was, perhaps still is, arguably the best GBAD gun in the world. Firing 550 × 35mm rounds per minute per barrel, its Skyguard system gave it an effective



*Having recently abandoned them in favour of missiles, the Regiment reverted to guns in the mid-1980s when No 2729 Sqn of the RAuxAF Regt was equipped with captured Argentinean twin-barrelled 35mm Oerlikons, complete with their Contraves Skyguard radar.*

range of more than 4,000 metres and it had an anti-missile capability. The Regiment was subsequently allowed to use these captured weapons to arm a squadron of the RAuxAF Regiment, earmarked for deployment in the UK or to Germany.

In 1981, the USAF had asked to have Rapier deployed to defend all of their UK bases. The missiles were to be manned and operated by the RAF Regiment, but paid for by the Americans, an unprecedented arrangement. The result was a wing HQ and four squadrons. Collaborative exercises were established with allied air forces operating similar systems, including French Air Force's Crotale and units of the German Air Force equipped with Roland; the latter led to a formal officer-exchange programme. RAF GBAD was looking pretty good, especially when the Regiment Depot at Honington was given overall responsibility for all GBAD training, for the Army, as well as the RAF from 1994 onwards.

## **Epilogue**

British Forces withdrew from Belize in 1990, where this narrative must end. There is much more that could be said, perhaps on another



*A Rapier firing during an exercise in Oman in 2007.*

occasion, to cover the ensuing years until the RAF lost its organic GBAD – to the British Army. Perhaps 1940 never happened; nor did Crete. Maybe that was all a bad dream. But, that said, the RAF Regiment today, even without its GBAD, has never been in better shape. It is involved in every aspect of ground operations and has had many intense combat encounters in Iraq and Afghanistan.

As we tend to say in the Regiment these days: **‘PER ARDUA’**

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## THE RAF SERVICING COMMANDOS 1942-46

### Wg Cdr Tim Newstead



*Tim Newstead enlisted as a Supply and Movements tradesman in 1964. Following tours in the UK and Middle East, he spent seven years with UKMAMS, logging more than 2,000 flying hours in the course of visiting forty-seven countries. Commissioned in 1983, his subsequent career in the Supply Branch included a tour with TSW at Stafford and stints in the Balkans with HQ SFOR in Sarajevo and at HQ AFOR at Durres. In retirement, after more than forty years in the RAF, Tim became Treasurer and Webmaster of the RAF Servicing Commando and Tactical Supply Wing Association.*

### Introduction

Sir Michael, Distinguished Guests, Ladies and Gentlemen, thank you for inviting us here today. I am delighted to have with me Alan McQuillin and Ernie Deighton, both of whom served as Servicing Commandos in Normandy and the Far East. My own involvement with the Servicing Commandos is through my service on Tactical Supply Wing – their latter-day successors – in the early 1980s and my subsequent involvement with their veterans association.

### Scope

My presentation this afternoon will cover the background, formation, staffing and equipment of the Servicing Commando Units before describing their *modus operandi* and training. If time permits, I will conclude with a few words on the operations in which the Servicing Commandos were involved. Of course, there will be the opportunity to ask these two marvellous men about their experiences; but be warned, they could keep you entertained with their stories (far better than ever I could) for hours!

Most of the information I will present this afternoon is drawn from two books – *The History of the RAF Servicing Commandos* by Kellett and Davies and Tom Atkinson's *Spectacles, Testicles, Fags and Matches* – which tell of the various exploits of the Servicing Commandos during the war.

## Background

I am somewhat hesitant to confess in such august company as this that I am not an historian! However, it seems to me, from reading the history of the Servicing Commandos, that it was not until the second year of the war, perhaps as a result of the lessons learned from the Battle for France, that there was an acceptance by the planners that it was desirable to have a mobile force of combat aircraft capable of flying from airfields near the battle zones. The advantages of such proximity were obvious enough, but so were the drawbacks. Any airfield close to the front line would be vulnerable to attacks by enemy tanks and infantry and to constant strafing from the air, but the military structure of the RAF was not designed at that time to cope with defending its own airfields until, as we have just heard, the formation of the RAF Regiment in February 1942. Furthermore, as you will well know, every front-line pilot needs a back-up team of several tradesmen to keep his aircraft operational. Transporting men to vulnerable airfields and keeping them supplied with large quantities of fuel, oil, coolant, spares, bombs and ammunition – not to mention food and water – would present major difficulties.

Much thought was given to finding solutions to these problems. Many, in both the Army and the RAF, were sceptical about the whole concept. However, on 22 January 1942, Lord Louis Mountbatten, Chief of Combined Operations, tilted the balance in a letter to the Air Ministry and recommended that RAF Servicing Commandos should be formed for use in combined operations.

Extracts from his letter<sup>1</sup> read thus:

1. In most combined operations the capture as soon as possible of an enemy aerodrome will be essential in order to allow our fighter, tactical reconnaissance and possibly bomber support aircraft to operate at maximum efficiency.
2. During the early stages it is probable that the use of the captured aerodrome would be limited to refuelling, rearming, flight maintenance, minor repairs and the minimum essential communications.

<sup>1</sup> Mountbatten's letter is reproduced verbatim by Atkinson (pp29-30 – see Bibliography at p110).

3. It is suggested that special servicing units should be established with the necessary ground personnel to undertake these duties on the basis of say one Servicing unit to look after three squadrons.

Two, of the four, specific recommendations put forward to DCAS were to:

‘. . . form ‘RAF Servicing Commandos’ with their equipment, and make them an essential part of the various fighter groups.

[and] as soon as we have some Commandos trained in their air duties, they should be sent in turn to the Combined Training Centre where they would go through a thorough training in their ‘Commando’ duties.’

### **Formation**

Just nine days later, on 31 January 1942, the Director of Organisation at the Air Ministry gave instructions for the formation of three volunteer Servicing Commando Units (SCU). Notices appeared in Station Orders asking for officers and men of selected trades – mainly aircraft technical trades – to volunteer for a dangerous task, which was not specified.

Soon there were sufficient volunteers to form the first three units, Nos 3201, 3202 and 3203 SCUs, plus enough men for two more, so Technical Training Command was given the go-ahead to form Nos 3225 and 3226 SCUs.

During 1943, following the valuable contributions made by the first three units to the success of Operation TORCH (the invasion of North Africa), Fighter Command formed five more units, Army Cooperation Command formed two and HQ Middle East sought volunteers for three units to be raised in-theatre to support fighter squadrons committed to Operation HUSKY in Sicily. In the latter case, only 400 officers and men were selected from the volunteers, so these three units were slightly under strength until their numbers were made up with tradesmen transferred from No 3225 SCU when it arrived in the Middle East in May 1943.

In all, fifteen Servicing Commando Units were formed in the UK and the Middle East, and three small units were formed in India during the summer of 1943. Although these smaller units were trained along

Unit	Parent Command	Date of Formation	Training Location	Operational Theatres
3201 SCU	Fighter	March 1942	UK	North Africa, Sicily, Italy, Southern France
3202 SCU				North Africa, Sicily, Italy
3203 SCU				
3225 SCU	Army Co-operation	August 1942	UK	Sicily, Italy
3226 SCU				
3204 SCU	Fighter	February 1943	UK	Sicily, Italy
3207 SCU		April 1943		Normandy, India, Burma, Indo-China, Malaya, Thailand, Java
3208 SCU				Europe
3209 SCU				Normandy, India, Burma, Indo-China, Malaya, Thailand, Java
3210 SCU				Normandy, India, Burma, Indo-China, Malaya, Thailand, Java
3205 SCU	Army Co-operation	April 1943	UK	Europe
3206 SCU				
3230 SCU	Middle East	April 1943	Palestine	Sicily, Italy
3231 SCU				
3232 SCU				
1 SP	3 TAF	July 1943	India	Burma
2 SP				–
3 SP				Burma

*Summary of the careers of the Servicing Commando Units/Parties of WW II.*

Commando lines, they were not designated as SCUs, but were known simply as Servicing Parties. Two of them were deployed in Burma, where they played a role similar to that of an SCU, keeping RAF (and USAAF) aircraft flying from remote airfields and landing strips. These SC units remained in existence for differing periods of time during the four years from March 1942 to March 1946 – I will return to this later.

### **Staffing and Equipment**

The Air Ministry instructions specified that each SCU would comprise two officers and 148 other ranks. The Commanding Officer was to be a Technical Officer holding the rank of squadron leader or flight lieutenant, while his second-in-command would be an Admin Officer with the rank of flying officer or pilot officer. There was to be a warrant officer, responsible for discipline.

The units were to be divided into flights, three or four technical and one headquarters flight, with a flight sergeant in charge of each. There would be a sergeant responsible for each trade and the flights would be split up into four sections, with a corporal responsible for each section. It never, I believe, worked out as precisely as that, but overall the organisation of the units pretty much followed this pattern.

Each unit would have fifteen three-ton trucks, a jeep for the CO and a couple of motorcycles. Only the minimum of servicing equipment would be carried in the trucks, and it was evenly distributed between them to minimise the effect of the loss of, or damage to, an individual vehicle. They would also carry pickets, ground markers, windsocks, entrenching tools and two-man bivouac tents, plus additional tenting for the aircrew. Fuel, ammunition, bombs, etc were not carried by the SCUs; these were to be ferried forward as required to the advanced airstrips. Each unit would include a cook, or cooks, and have facilities for the provision of hot meals for the unit's own personnel and for any transient aircrew.

### ***Modus Operandi***

It was not to be the duty of the Servicing Commandos to fight for airfields; their role was to permit them to function once they had been secured. This was specifically laid down in the directive that led to the formation of the SCUs which stated that, 'The object of these units will be the occupation of advanced landing grounds as soon as they



are captured by the Army.’

The Commando units would be put ashore from landing craft, complete with transport and equipment and make their own way to the airfield. Once the airfield had been captured, the front-line squadrons would fly in, and while the Servicing Commandos attended to the aircraft, convoys of trucks would bring up their supplies. As Fighter Command would be responsible for the deployment of the SCUs, each unit would be trained to service fighter aircraft and to keep those aircraft operational to support the front-line troops until the battle had moved on and squadron personnel would be brought in. The SCUs would then pack up and move to another forward airfield as soon as it was safe to use. (At the time, 1942, ‘fighter aircraft’ meant Spitfires and Hurricanes, but as the war went on the SCUs were called upon to service almost anything that flew, with or without special training). An SCU would be expected to be capable of looking after three squadrons of fighter aircraft, two squadrons of light bombers or one squadron of medium bombers, and keeping them operational from a forward airstrip during daylight hours. The more highly skilled tradesmen were trained to become experts on one type of aircraft so that they could instruct other members of an SCU who were not familiar with the type.

While not primarily intended as a fighting force, all Servicing Commando personnel were to undergo intensive combat training so that, if necessary, they would be capable of defending their airfields without reliance on the Army.

### **Training**

The training syllabus was similar for all the Servicing Commandos, whether they were trained in the UK or in the Middle East, so that any unit could be sent to any theatre of war.

While the men were already technically competent and were reasonably physically fit, they were a long way short of the standard of fitness demanded by the Commando instructors. So the rigorous training for all ranks began with route marches, cross country running, battle tactics, full-pack forced marches, unarmed combat, bayonet practice, swimming, PT, compass and map reading exercises and much else. Any man who did not measure up to the high standard set was posted elsewhere without delay.



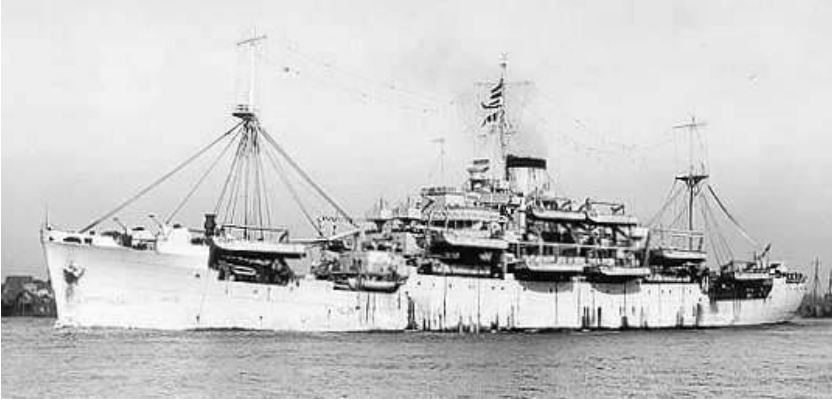
*LCT(4) 1195 being launched at the Warrenpoint shipyard, Co Down.*

Every member of the SCU had to learn to drive and take a course on motor transport maintenance, together with instruction for waterproofing vehicles which were to take part in invasion landings onto beaches, in case they were dropped into deep water.

Most of the men survived that stage of training, and indeed it was very obvious that a remarkable degree of pride and *esprit de corps* was developed and nurtured during those weeks of hard physical work and learning.

In the UK, the survivors of the first stage of training were sent to the Inveraray Combined Services Training Centre on Loch Fyne, which was staffed by members of all three services.

The SCs were taught how to load their trucks on to a Tank Landing Craft (LCT) in the correct order and with the correct load of men and materials. LCTs were sea-going craft, carrying ten or a dozen trucks, but being flat-bottomed and blunt bowed, were hellishly uncomfortable in any sort of rough sea. They had no accommodation of any kind for passengers, and normally only the truck driver and second driver would accompany the trucks. In training, however, the trucks carried their full load of men and equipment. The LCTs had an opening ramp at the front, permitting the craft to run onto the beach and lower the ramp so that the trucks could make a dry landing. Alternatively, the ramp could be dropped in a few feet of water obliging the trucks to ‘wade’ onto the beach.



*Above – an LSI (HMS Glenroy) with LCAs slung on its derricks and, below, the Royal Navy's LCA 1377.*



Again in training, the men were carried in a Landing Ship Infantry (LSI). These were bigger vessels, with rudimentary accommodation for several hundred men. The LSIs carried a number of smaller craft slung on derricks and ready to be lowered into the water. These smaller vessels were Landing Craft Assault (LCA), designed to carry perhaps fifty fully armed and equipped men, sitting on benches, and facing forward to the ramp at the bow. The idea was that the LCAs were lowered into the water from the LSI mother ship, and the men



*The much-prized red-on-black  
Combined Operations badge.*

then went over the side and down scrambling nets into the waiting assault craft.

The landing of heavy transport on a beach could be a hazardous operation, especially if the vehicles were driven down a ramp into several feet of water, and practices, in full operational kit, often resulted in casualties, although the Navy anticipated the occasional sinking and had small rescue craft and rafts standing by. Final practice landings usually took place using live ammunition and simulated air cover

and/or smoke screens. After fourteen days of day and night training, the SCUs went to sea in an LCT, whatever the weather conditions, later disembarking and undertaking final practice landings on the beaches at Troon, Ayrshire.

After the specialist Combined Operations training in Inveraray, and now entitled to wear the cherished Combined Operations badge, the units continued with their training. They were scattered around the UK, frequently in detachments of single flights, but now actually practising what they would be doing in action; that is to say, servicing aircraft in operational conditions. As the months passed, virtually any sort of aircraft from the lightest of reconnaissance aircraft to the heaviest bombers – both British and American – were, re-armed, re-fuelled, repaired and sent off again.

As described earlier, it had been anticipated that each SCU would be capable of looking after three squadrons of fighters. That target was soon surpassed, and there were occasions when an SCU serviced six squadrons and serviced them so fast and well that pilots (jokingly) complained they hardly had time to stretch and relieve themselves before some disreputable character, unshaven, dressed in filthy overalls and wearing a tin hat, told him his kite was ready and that his hardstanding was urgently required for the next job!

Always the men of the Servicing Commando put every ounce of their skill and strength into the job. The *esprit de corps* was

Date	Operation	Location	SC Units
November 1942	TORCH	North Africa	3201, 3202, 3203
July 1943	HUSKY	Sicily	3201, 3202, 3203, 3204, 3226, 3230, 3231, 3232
September 1943	AVALANCHE	Italy – Salerno	3201, 3202, 3203, 3204, 3226, 3230, 3231, 3232
March 1944	THURSDAY	Burma	Nos 1 & 3 SPs
June 1944	OVERLORD	Normandy	3205, 3206, 3207, 3208, 3209, 3210
August 1944	DRAGOON	Southern France	3201
December 1944		India to Java	3205, 3207, 3209, 3210

*Specific Operations in which the Servicing Commandos participated.*

remarkable. They were Servicing Commandos – they were ready to go anywhere and tackle any job. They were special – and they were proud of it!

## **Operations**

In all, Servicing Commandos Units were in existence for just over four years from 1942 to 1946 and they took part in a number of operations during that time: Time precludes my going into much detail; however, I will just mention some of them.

### **Operation TORCH – North Africa**

The first SCUs to see action were Nos 3201 and 3202 during Operation TORCH which was mounted in November 1942 to gain control of Morocco and Algeria. These two units made amphibious landings near Algiers on 8 November and made their way to the aerodrome at Maison Blanche – now Algiers Airport – 11 miles east of the city where they spent the next few days servicing five squadrons of Spitfires and Hurricanes and a mixture of other types that happened to pass through the airfield. The *Luftwaffe* bombed and strafed the airfield every day, dropping anti-personnel mines and delayed-action bombs. As there was no bomb disposal unit in the area, the Servicing Commando Armourers had the unpleasant task of dealing with these things.



*Sicily, 1943 – members of an SCU about to start work on one of No 43 Sqn's Spitfire Vs at Comiso.*

No 3203 SCU disembarked at Bône some 250 miles to the east in December and after some days in a transit camp, set out on a 300-mile road trip to Blida, south-west of Algiers. The history shows that all three SCUs frequently operated as small flights and sections in varying degrees of completeness, rather than as a whole, as they found themselves at several airfields scattered throughout the region for the following six months or so. This operational necessity clearly demonstrated the adaptability and flexibility of both the SCUs as a whole and of the Servicing Commandos as individuals. The units acquitted themselves extremely well in very trying and dangerous situations attracting a commendation for Devotion to Duty from the AOC Eastern Air Command.

### **Operation HUSKY – Sicily, and Operation AVALANCHE – Mainland Italy (Salerno)**

Eight SCUs were directly involved in Operation HUSKY during July and August 1943, with one unit, No 3225, held in reserve in Palestine. This says much for the fortitude and efficiency shown by



*Normandy, 1944 – SCU personnel preparing a 3-inch rocket before arming a Typhoon. Less easy to make out here, but on the original photograph, it is clear that all of these men are wearing the Combined Operations patch.*

the first three units, and the useful part they had played in Operation TORCH.

In September 1943 Op AVALANCHE took the same eight Servicing Commando Units to mainland Italy where they remained until the end of the year. Sadly, with the exception of No 3201 SCU, all the other units that had been so intimately involved in North Africa, Sicily and Italy had been disbanded by the end of that year – 1943.

### **Op OVERLORD – Normandy**

Six SCUs had been formed in April 1943 to take part in Operation OVERLORD, and all six were in Normandy within a week of D-Day. Four units went ashore the day after the initial landings. Indeed, Ernie's and Alan's units, Nos 3207 and 3210, were the first SCUs to land in Normandy. The last two units disembarked one week later. The landings were not without difficulties as sinkings of landing craft

and the resultant casualties caused some initial dislocation.

The Airfield Construction Companies began building forward airstrips as soon as the beachhead had been consolidated. Meanwhile, army transport units brought in lorry loads of petrol, oil, bombs, ammunition and other essential equipment and supplies. During the first two months of the invasion twenty such airfields were constructed between Bayeux and the coast to the north of Caen. The SCUs served at the majority of these forward airstrips. They were allocated to the various groups of the 2nd Tactical Air Force to handle whatever aircraft came their way – including light and medium bombers, Dakotas, Spitfires, Tempests, Typhoons, Mosquitos and Mustangs. Of the six units that deployed, two stayed until the spring of 1945 advancing to airfields in Belgium and Holland. The remaining four units – including Ernie's and Alan's – remained in Normandy for just 2-3 months before being withdrawn just as the Allies were breaking out of Normandy and they returned, dejectedly, to the UK and an uncertain future. There they spent their time modifying and preparing aircraft for despatch to France and half expecting to receive the news that the units were to be disbanded, but on 30 September they were told that the Servicing Commandos were to be transferred to Air Command South East Asia (ACSEA).

### **India to Java**

Thus it was that during December 1944 and early January 1945 the four surviving SCUs were redeployed to India to help maintain the aerial armada into Burma. This was the longest of the operations in which the Servicing Commandos were involved. They worked their way from India to Burma, the Malay Peninsula and Singapore – and for two of the units, Nos 3205 and 3210 SCUs, on to Java. The work on which the units were involved was variable and often not work that they had trained for or wanted to do. The conditions were frequently trying for both aircrews and ground crews.

### **Conclusion**

Throughout their periods of service the Servicing Commandos faced many challenges – not just from the weather – or the enemy! They found themselves in situations for which they were ill prepared through lack of the right equipment to service the aircraft they were faced with or through poor communications; yet through it all,





*Java, 1943 – members of an SCU working on a Thunderbolt at Kemajoran.*

whatever job they were asked to do, they did it well – often through the application of initiative and ingenuity and, more often than not, they came out smiling.

Over the years, the Servicing Commandos were rarely mentioned in the records and their contribution to the Allied victory, both in Europe and in South East Asia, has been generally overlooked. As a result, the majority of people, including many who served with the armed forces between 1939 and 1945 and later (and I include myself) have little or no knowledge of the brief existence of the RAF Servicing Commandos.

They were frequently misemployed, or unemployed, due to a feeling of resentment in high places at having such unorthodox, dual-purpose units foisted upon them – and through lack of knowledge in the right places of what their capabilities were.

Certainly the Commanding Officers of the SCUs were often irritated and perplexed by the lack of orders and co-operation from AOCs and Wing Commanders who did not deploy or utilise the SCUs to the best advantage or allow them to fulfil their proper front-line role.

Although a great deal of time and effort was expended on the

training of the fifteen SCUs and the three smaller Servicing Parties, they rarely had the opportunity to demonstrate their full potential. No 3225 SCU spent most of its time in Palestine and Egypt and had no opportunity at all to show what it could do, although it may have been intended for an operation in the Dodecanese Islands, or possibly in Crete or Greece. No 2 Servicing Party played no part at all in the very campaign in Burma for which it had been formed.

During peak periods of activity, as in the initial stages of an operation, the men of the SCUs worked night and day, in great danger and discomfort. Apart from their primary task of refuelling and rearming a constant stream of combat aircraft, they often had to find the time to change propellers or an engine, or to cannibalise a damaged aircraft for spare parts.

In the later stages of the war, it tended to be the personnel of the Servicing Echelons attached to squadrons, and not those of the SCUs, who were sent to operate at forward airstrips, which suggests that the air force establishment had finally grasped the obvious advantages of having well-equipped and mobile ground crews who could be rapidly deployed to provide the back-up services for front-line air support.

It was the Servicing Commandos who had shown the way. It is a pity that they were never really given the credit for this that was their due.

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## ROYAL AIR FORCE REPAIR AND SALVAGE 1939-1945

### AVM Peter Dye



*As an Engineering Officer, Peter Dye spent 35 years in the RAF, 20 of them supporting frontline operations, notably those involving the Jaguar and Tornado. Among his later staff appointments he was responsible, within the Defence Aviation Repair Agency, for the overhaul of all RAF, RN and Army aircraft. As the third generation of his family to serve in the RAF, he has a passion for its people and traditions. He has written widely on aspects of the history of the Service and led the campaign to erect, at St Omer, a memorial to*

*the British Air Services of WW I. He joined the RAF Museum in 2008, becoming its Director General in 2010.*

It might be thought that recycling on an industrial scale is a practice firmly anchored in the late twentieth century; driven by the increasing influence of the environmental lobby and soaring commodity prices. In fact, the widespread and energetic collection, sorting and re-use of scarce materials underpinned the RAF's engineering effort in both the First and Second World Wars. This is quite literally a vast subject and I only have time to scratch the surface of what developed into a complex and extensive enterprise that played a significant part in sustaining British and Allied air power.

By way of setting the scene and to provide some historical context, I will begin with a brief review of the repair and salvage arrangements developed on the Western Front before turning to the RAF's repair and salvage organisation during the Second World War. My scope will include the Civilian Repair Organisation, set up shortly before the outbreak of war, which worked closely with the RAF's own engineering and supply organisation. In the interests of time, I will focus on the effectiveness of the repair and salvage system during three critical periods: the Battle of Britain; the Bomber Offensive; and Normandy (in support of Second Tactical Air Force). I will end with some observations on the overall effectiveness of the repair organisation.



*Damaged aircraft awaiting recovery at Bahot in the Repair Park of No 2 Aeroplane Supply Dept in August 1918.*

### **The Western Front**

As the first war waged on an industrial scale, employing mass-produced weapons and consuming immense quantities of raw materials, the First World War is widely regarded as the first ‘modern’ war. It was also a war that was hugely wasteful, not only in human life, but also in national wealth. The high cost of producing modern weapons was only exceeded by the high wastage experienced on the Western Front. Air power proved itself particularly expensive. Plans for the substantial expansion of the RAF’s frontline by 1918 (beyond the ninety squadrons serving on the Western Front at the Armistice) were never realised – largely because of the immense wastage in men and machines that exceeded the capacity of the flying schools and the factories to replenish.

Although British industry proved capable of mass producing combat aircraft, there were never enough machines to cope with operational wastage. The RFC’s logistic system on the Western Front

was built around a series of depots and repair parks that retrieved, repaired, modified and issued aircraft and aero-engines on an equally massive scale. The driving force behind these arrangements was Brigadier (later Air Chief Marshal Sir) Robert Brooke-Popham. His reputation has undoubtedly suffered because of his subsequent involvement in the loss of Singapore, but there is no doubt that he was an able and effective administrator, who did much to sustain the RFC's operational capability in the First World War. He was also an influential figure in shaping the RAF's thinking about wartime repair during the re-armament period – as we will see.

Between January 1918 and the Armistice (10½ months) some 7,300 aircraft were struck off the charge of RAF squadrons on the Western Front. During the same period just over 7,400 new aircraft were delivered to France, however, frontline numbers had actually grown from just 900 in January 1918 to nearly 1,800 by the Armistice. The outstanding balance was made up from repaired aircraft provided by the main supply depots at Candas and St-Omer. Nearly 1,500 aircraft were returned to the frontline as a result of their efforts, including a similar number of repaired engines provided by the Engine Repair Shops at Rouen. In other words, some 17% of all aircraft issued in 1918 to the squadrons on the Western Front were provided by the RAF's own repair organisation. Even more impressive, however, were the efforts of the RAF's salvage sections which recovered nearly 5,800 aircraft across the Western Front in 1918, some 80% of wastage. When one remembers that 20% or so of combat losses were east of the lines this suggests that near enough 100% of all aircraft wrecks were retrieved for repair or reduced to produce for their metal content, components and piece parts – to be cleaned, assessed, repaired and re-issued.

### **Inter-War Planning**

The rapid reduction in the size of the RAF after the Armistice and the years of austerity that followed did not mean that the lessons of the Western Front were forgotten. In a lecture given in 1919, Brooke-Popham explained the importance of substantial reserves and a plentiful supply of spare parts – as well as the need for large depots and an efficient channel of supply.<sup>1</sup> Later, as the first commandant of the RAF Staff College, he ensured that every student at Andover was



*Robert Brooke-Popham, who was influential both during and after WW I in setting up the RAF's logistic system.*

provided with a set of tables detailing the immense engineering effort and high rates of consumption in men and machines that characterised air warfare. The technological advances in design, aircraft structures and engine power that emerged during the inter-war period did not alter his belief that war would bring high wastage. Speaking in 1934, as rearmament began to get underway, he argued that it was unlikely that the rate of wastage would be less than in the last war with frontline squadrons losing up to 50% of their strength each month.<sup>2</sup>

Brooke-Popham was not a lone voice, however. The Air Staff began as

early as 1927 to address the arrangements needed to support an RAF Expeditionary Force and, in particular, the organisation of maintenance during a mobile campaign. It was believed, based on the First World War experience, that the establishment of deployed squadrons should be kept as low as possible to enhance mobility. Squadrons were therefore to be relieved of all repair work and hold only three day's worth of spares. Behind the squadrons, and within 25 miles, would be a number of air stores parks carrying a month's supply of spares. Behind them, in turn, would be a non-mobile depot holding up to six month's supply of spares and undertaking all repairs. To cope with the frequent squadron moves that were anticipated,

advanced repair detachments would be provided close to the squadrons.

These proposals were opposed by those who felt that squadrons should be as self-sufficient as possible. Such views were reinforced by the idea that war would be brutal and quick, leaving little time for repair. In 1934 the then CAS, Sir Edward Ellington, directed that expeditionary squadrons should indeed be self-supporting in the event of war. This would prove to be a misguided policy that led to substantial materiel losses amongst the aircraft deployed as part of the Advanced Air Striking Force and the Air Component of the British Expeditionary Force. For example, only 66 of the total of 452 Hurricanes sent to France returned, no fewer than 178 were abandoned or destroyed through lack of repairs. Only a relatively small number (17%) were actually lost in air combat.

The squadrons in France found themselves desperately short of reserves, vehicles, spares and repair and salvage capabilities. The latter deficiency had been belatedly recognised in 1939 and steps were underway to create forward repair and salvage units (much as originally proposed in 1927) but the limited resources provided proved incapable of coping with the level of arisings or to handle the repair work beyond the capability of the squadrons. The lack of vehicles and specialist equipment affected the air parks and depots particularly badly. As a result, they became immobile and increasingly ineffective. In-theatre repair initially amounted to a mere two Hurricanes a week and had risen to only eight a week by June (and this only after considerable effort). Almost no engine repairs had been completed due to a shortage of tools. It was not the repair organisation's finest hour.<sup>3</sup>

The need for a comprehensive repair system at home had occupied the Air Staffs from 1934 onwards. The first challenge was to decide if there was any need for repair in wartime. This may seem a self-evident question, but it was argued that it was more efficient to focus on production, reducing damaged aircraft to produce, rather than employing limited resources on rebuilding damaged airframes and engines. However, the recognition that Britain was dependent on overseas sources for some 66% of the light metals used in aircraft production was a powerful argument in favour of repair – as was the fact that large quantities of machine tools would need to be purchased

from abroad to expand production capacity in the absence of repair. The conservation of scarce resources therefore became compelling factors in pre-war planning.<sup>4</sup>

Even so, it was not until 1938 that the first plans were drawn up for a wartime repair organisation. The initial plans, drawn up by AMSO (Air Marshal Sir William Welsh) envisaged that the RAF would be self-sufficient in repair. Whether he ever believed that this was a practicable proposition is unclear, although the manufacturers' insistence that they had no capacity to undertake repair must have had some bearing. However, as this scheme depended on the expansion of the existing depots which was itself dependent on the RAF's wider mobilisation, it could not be brought into operation immediately. It soon became clear that neither the RAF nor the aircraft manufacturers were in a position to undertake repair on a large scale. Only one element of this scheme, the RAF Repair and Salvage Units (RSU), survived the upheaval that war would bring.

AMSO therefore proposed a second scheme that retained an RAF-controlled repair organisation but introduced civilian labour. It was anticipated that civilian-manned depots would take on up to 75% of all work, with service-manned depots completing the remainder. Even so, this still did not address the immediate challenge and it was reluctantly agreed to employ 'fringe' firms to undertake repair work. The firms concerned all had some connection, however, tenuous, with the aircraft industry. They were a diverse group ranging from sub-contractors to flying schools with maintenance workshops.<sup>5</sup>

Simultaneously with these plans, AMSO reorganised and enlarged Maintenance Command. Amongst the new groups created was No 43 Group which would play a major role in the repair process throughout the war with additional responsibility for maintenance, salvage and supply. At this stage, the 'fringe' firms were still seen as a stop-gap, pending the completion of the major service-manned depots. On the outbreak of war, Lord Nuffield was offered responsibility for managing the first of the civilian-manned depots (Burtonwood). He argued, however, that there was now the necessary capacity in industry to undertake the repair task and much of the work destined for the RAF's depots should be transferred to specialist firms. He further argued that the management of this scheme, involving the coordination of scattered production facilities should be transferred to





*Salvaged Spitfires being rebuilt in a CRO plant circa 1941.*

civilian control. AMSO initially objected but the scale of the task and the evident inability of the RAF depots to cope – while still rapidly expanding and with rapidly growing overseas commitments – persuaded the Secretary of State for Air to agree to the creation of the Civilian Repair Organisation (CRO) in October 1939, based at Cowley, with Lord Nuffield as Director General of RAF Maintenance. The inception of the CRO was part of the general movement towards the full mobilisation of the nation's aircraft industrial resources that culminated in the creation of the Ministry of Aircraft Production (MAP) in May 1940. At this time, technical control of No 43 Group passed to the CRO, itself part of MAP. Thereafter the two organisations functioned as a single entity, albeit with slightly different roles and capabilities.

There is little doubt that the establishment of the CRO and the creation of MAP created the basis for an efficient and increasingly effective repair organisation as the war progressed. For example, until May 1940, the backlog at Cowley had steadily grown to more than 700 airframes awaiting repair while weekly output languished at around 20. By June this had risen to 99 per week and by September it reached no less than 199. It should be noted, however, that engine and propeller repair were placed outside the CRO being largely undertaken



*Recovery of a damaged Battle of Britain-era Hurricane, No 249 Sqn's P3154, following a forced landing near Wellingore on 23 July 1940. It flew again, only to be lost in October..*

by the manufacturers themselves.

Salvage was undertaken on a regional basis with the country divided into sixteen areas each served by one RSU. There was little substance to the organisation on the outbreak of war but the lack of transport equipment was compensated for by using civilian haulage contractors while offices and buildings were improvised. This proved highly effective and more than 1,800 aircraft had been handled by May 1940 when all the units were transferred to the CRO. During the course of the war over 127,000 aircraft crash sites were investigated, including the salvage of over 1,400 American aircraft in 1944 alone.

### **The Battle of Britain**

While the Battle Of France revealed the inadequacy of the RAF's expeditionary repair and salvage arrangements, the Battle of Britain was a resounding success – demonstrating the effectiveness of the pre-war planning and, in particular, the critical importance of the CRO. Between June 1940 and March 1941 nearly 2,400 Spitfires and 3,400 Hurricanes were delivered to the Metropolitan Air Force, however 40% of the Spitfires and 37% of the Hurricanes were provided by the repair organisation (both No 43 Group and the CRO). More importantly, in September and October 1940, this total approached 50% while the time cycle (the period between the damaged aircraft being received and the necessary repairs being completed) fell to just six weeks. As a result, half of the Spitfires and Hurricanes provided to the frontline at the height of the Battle of Britain were produced solely as a result of the repair organisation's efforts. The significant increase



*After sustaining damage from a Bf 110, the undercarriage of this Stirling, N3666 of No 7 Sqn, collapsed when the aircraft landed at Newmarket on 28 August 1941. This one never flew again.*

achieved in September reflected the ability of No 43 Group and the CRO to surge to meet unprecedented (but not unanticipated) operational demands and their flexibility in switching from other aircraft types in order to concentrate on the Spitfire and Hurricane. It is fair to say that without the CRO, the Battle of Britain could not have been won.

An important development that took place while the fighting was underway was to direct aircraft that had been damaged in combat to an airfield capable of undertaking repairs on that type of aircraft. These 'Fly-In' repairs proved particularly effective allowing a damaged aircraft to be returned to service in a matter of days rather than weeks caused by the need to strip down and ship the aircraft by road to the appropriate repair unit.

### **The Strategic Bombing Offensive**

It was realised from the outset that the repair of heavy bombers presented unique challenges. Their size largely precluded transfer by road to the contractors' workshops while there were few facilities actually capable of housing such large aircraft. Their complexity also demanded a range of skills and equipment that were not readily available while their weight limited the airfields that they could fly from.<sup>6</sup> As a result, a different approach was taken – with the three parent firms (Shorts, Handley Page and Avro)<sup>7</sup> assuming responsibility for the repair of their own aircraft. New factories were built, close to the operational area of the type concerned.

This system had considerable advantages from a technical, contractual and service perspective. Even so, the transport difficulties proved challenging and from 1942 onwards the emphasis shifted to 'on-site' repair of heavy bombers. This in turn required the building of large hangars to undertake repair as well as spares recovery. Ultimately, these facilities handled over 85% of all arisings, which by 1944 were running at over 400 heavy bombers per month. Between June 1942 and May 1945 over 6,800 heavy bombers were repaired either 'on site' or at the manufacturers' works. In 1944, at the height of the Strategic Bomber Offensive, some 37% of the total heavy bomber output came from repair, compared to just 25% two years before. The ability to increase production in heavy bombers reflected the inherent flexibility of the repair organisation.<sup>8</sup> Just as important, however, was the CRO's overall contribution to the Metropolitan Air Force. During the course of the war, repair provided just over 79,000 of the 164,000 aircraft delivered, or some 48% of the total supply. An impressive achievement in every sense and considerably more than the First World War repair output.

Returning to an earlier point about the desirability of repair, it was fully recognised that a repaired aircraft required spares that might have otherwise been employed on new production. Of the 9,018 Lancasters supplied to Bomber Command between July 1942 and September 1945 over 3,816 were provided by the repair organisation (a figure slightly exceeding all operational losses). At the same time, total spares production amounted to the equivalent of just over 600 aircraft. In other words 3,800 additional airframes were provided at the cost of 600 airframes in lost production (assuming that all spares were consumed in repair activities rather than some being allocated to maintenance). The chosen strategy of production supplemented by repair was therefore hugely more economic than one of production and no repair.

## **Second Tactical Air Force**

The aircraft repair organisation developed to support RAF operations in Northern Europe owed much to the lessons learnt over the previous five years, at home and in North Africa. Under Air Vice-Marshal Graham Dawson, the Desert Air Force had developed a highly effective Service-manned network of forward Maintenance



*The procedures for the recovery of aircraft in the field on an industrial scale were first established by the Desert Air Force in North Africa. Taken on charge by No 45 Sqn on 25 January 1942, this Blenheim IVF, N3581 lasted for only one day as it was extensively damaged while attempting to land at Bu Amud in a severe sandstorm on the 26th. It was a write-off.*

Units with thirteen mobile Repair Sections and twelve mobile Salvage Sections. Behind these were a further three mobile Salvage Sections and six mobile Repair Sections for heavy bombers. This spider's web of units, criss-crossing the desert, was supported by secure, dispersed depots around Cairo.<sup>9</sup>

For the invasion of Europe, it was decided that immediate repair would be the responsibility of the Squadron Servicing Echelons (SSE). These units had been formed in the spring of 1944 with the intention of attaching them to the deployed flying units as required. In the event, most stayed with their parent units throughout the campaign.<sup>10</sup> Repair beyond the capability of the SSE fell to one of ten RSUs, each specialising on a limited range of aircraft types. Thus, No 403 RSU undertook the salvage and repair of Typhoons while No 411 RSU handled Spitfires and Mustangs. These units removed all damaged or unserviceable aircraft from the squadrons that were likely to take more than 48 hours to repair, providing immediate replacements.

This organisation allowed squadron strength to be sustained at a minimum level of twelve operational aircraft throughout the



*A damaged Mitchell, FW161 of No 180 Sqn being, surgically dissected prior to loading onto a 'Queen Mary'.*

campaign. Where repairs were expected to take longer than 28 days the aircraft was either dealt with by No 511 Forward Repair Unit (FRU) or shipped back to the CRO. The FRU grew steadily in size during the campaign, eventually comprising over 4,000 personnel. In August 1944 alone it repaired over 100 aircraft, 121 engines and 268 propellers.<sup>11</sup> As a result of these efforts, 2<sup>nd</sup> TAF's fighter strength was maintained at over 1,000 fighters and 250 bombers throughout the four months of intensive fighting from June-September 1944 with average serviceability never falling below 83%. A significant improvement over the repair organisation's performance in France during May 1940.

### **Conclusions**

The contribution of repair and salvage to RAF operations during the Second World War was substantial. Built on the successful but modest foundations laid in the First World War, repair became a major war-winning strategy. The efforts of the salvage teams and repair units during critical periods, such as the Battle of Britain, proved decisive. The employment of manufacturers and sub-contractors – as part of the 'fringe' organisation – provided a flexible

and responsive arrangement that could adjust rapidly to changing needs or priorities. It also offered significant economies in material and labour while generating high levels of availability and serviceability. At its peak, in 1943, the CRO employed just over 63,000 personnel and produced nearly 18,000 airframes against some 664,000 personnel employed in the production of 26,000 new aircraft. During the course of the war the CRO repaired slightly over 80,000 aircraft compared to a total new production of 131,000 (excluding overseas purchases).

Overall, the repair and salvage organisation, with its mixture of Service- and civilian-manned units, demonstrated the value of a professional and open-minded approach to meeting wartime repair needs. Although there were some tensions in the allocation of responsibilities, and it would have been better for all field repairs to have centred on the parent manufacturer, it was an approach largely free of dogma or jealousy. In itself, this was a remarkable achievement under the circumstances.

#### Notes:

<sup>1</sup> Brooke-Popham, R; 'The Air Force', *RUSI Journal*, 1920, pp43-70.

<sup>2</sup> Williamson, G W; 'Some Problems of a Technical Service', *RUSI Journal*, 1934, pp780-800.

<sup>3</sup> TNA AIR 16/1023, 'Report on Operations of the British Air Forces France'.

<sup>4</sup> TNA AVIA 46/168, 'The Repair and Maintenance of Aircraft 1939-1945'.

<sup>5</sup> Some nineteen firms formed the nucleus of the CRO, together with five parent firms undertaking repair. TNA AVIA 46/168, pp30-31.

<sup>6</sup> It was assessed that the average bomber required 3,000 man-hours compared to 500 for a fighter.

<sup>7</sup> With factories based near Cambridge, Waddington and York respectively.

<sup>8</sup> The one-piece structure of the Stirling resulted in a thirteen-week repair cycle compared to just eight weeks for the Lancaster because of its detachable sections.

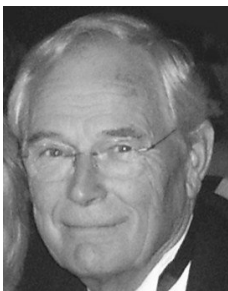
<sup>9</sup> Owen, R; *The Desert Air Force* (London, Hutchinson, 1948) pp58-59.

<sup>10</sup> Shores, C & Thomas, C; *2<sup>nd</sup> Tactical Air Force* (Hersham, Ian Allen, 2006) pp549-551).

<sup>11</sup> *Ibid*, p549.

## **MOBILE FIELD PHOTOGRAPHIC UNITS**

### **Jointly drafted by Gp Capt Geoffrey Oxlee and Wg Cdr Mike Mockford (presented by the latter)**



*Geoffrey Oxlee joined the RAF in 1954 as an imagery analyst. His early experience included tours with Nos 58 and 39 Sqns, as an exchange officer with the USAF and as an instructor at the Joint School of Photographic Interpretation. Later appointments included Head of DI7 (responsible for special intelligence information technology projects) and at JARIC, which he eventually commanded until he retired from the RAF in 1987. In 1990 he set up the Kalagate Imagery Bureau to provide forensic imagery analysis services to police forces and the legal profession.*



*Mike Mockford joined the RAF in 1952 as a photographic tradesman, serving in the UK, Singapore and Norway before being commissioned in 1965. Subsequent tours included stints in Malta and the USA (twice, once on exchange with the USAF) and the inevitable interludes with the MoD and at JARIC. On retirement from the RAF in 1989 he spent the next twelve years with the DIS, initially as an analyst, later dealing with IT facilities. He is a Trustee of the Medmenham Collection and was Hon Sec of the Medmenham Club for twenty years.*

### **Introduction**

The ability to see the enemy and assess his intentions has always been a dominant factor in the history of successful military operations. The aeroplane enabled man to gain height and thus see both further and into hitherto dead ground. Photography enabled the data to be permanently recorded and thus alleviated the frailties of the human memory. Just as it had done in WW I, therefore, aerial photography would play a vital part in WW II. Indeed, as General Von Fritsch, of the German High Command said, in May 1938, ‘The military





*An airmen loading a camera, in this case an F8, into a Spitfire.*

organisation with the best aerial photo-reconnaissance will win the next war' – how right he was.

Today it is my privilege to speak to you about a very important aspect of the reconnaissance cycle – mobile photographic support.

Since Mobile Field Photographic Sections (MFPS) were designed to support deployed recce squadrons, I will be concentrating on the tactical side of operations and will largely ignore the glories of Douglas Kendall, Constance Babington-Smith and the other strategic photo-interpreters, who added so much to Allied intelligence by their many discoveries, not least that of the experimental rocket testing facilities at Peenemunde.

Prior to an operational sortie, the task of an MFPS was to load and fit the cameras into reconnaissance aircraft. When the aircraft returned, they recovered and developed the films and then produced positive prints, all in the shortest possible time so that the results could

be interpreted with the minimum of delay. In many cases, to save valuable time, photo-interpreters learned to 'read' from the negatives. Since photo-intelligence needed to be passed to commanders and operational planners without delay, photographic support was deployed as close to the front line as possible; hence mobility was essential. To this end, special equipment, housed in large and somewhat cumbersome vehicles, had to be developed in order to realise the concept of the MFPS.

It could be said that this was a logical extension of the front line photographic support developed during the First World War.

The exploitation of the photographs was undertaken by hastily trained photo-interpreters on the squadrons and at area HQs. These interpreters were mostly ex-aircrew who, although they lacked the depth of training and understanding of today's imagery analysts, nonetheless produced excellent results.

Since there were a number of MFPSs deployed during WW II, it would take more time than we have available to cover them all. I have therefore chosen the story of No 7 MFPS to illustrate the concept. Here, I am deeply indebted to the late James Marett – a photographer with the unit whose written history I have adapted for this presentation.

### **No 7 Mobile Field Photographic Section**

No 7 MFPS had a relatively short history. It started life at Hartford Bridge (renamed Blackbushe in 1944) in June 1943, when No 34 Wg was assigned to Fighter Command's newly formed Tactical Air Force (which became the autonomous 2nd Tactical Air Force in the following November), and it disbanded in August 1945. Its operational life was even shorter. Following the cessation of hostilities in Europe and the return of the unit to Britain, it was effectively dispersed in June 1945. Despite this brief existence, it was extremely active and its output, in terms of negatives and prints, was impressive

The MFPS was formed from the Photographic Sections of Nos 16 and 140 Sqns. At the time, No 16 Sqn was flying Mustang Is while No 140 Sqn was operating a variety of types, including some Spitfire IVs and XIs. The men of No 140 Sqn's Photographic Section were an extremely capable team which included several former teachers with university degrees and a number of highly qualified and experienced

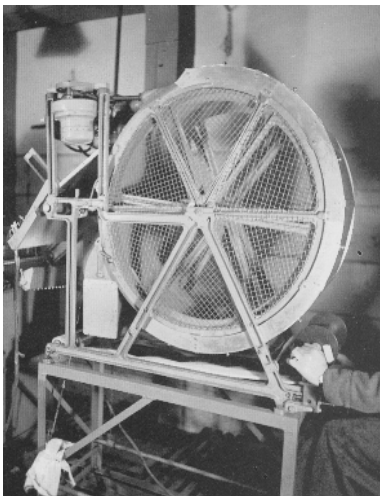


*One of purpose-built mobile photographic vehicles; a string of these constituted a 'Blue Train'. (Cpl C E Lloyd via Roy Nesbit)*

professional photographers, plus a few keen amateurs.

As indicated by its designation, No 7 MFPS eventually became completely mobile, equipped with self-drive vehicles known as 'The Blue Train' – this name deriving from the specialist vehicles which had long curved roofs reminiscent of continental railway carriages. The unit had three of these, one devoted to film processing, which could accept films up to 9" wide and any length, while the other two produced prints from the resultant negatives. The vehicles contained large, continuous-processing machines, in which the rolls of exposed film or paper were run through various chemical or washing baths, before being dried on a large electrically-heated drum. The design of these machines was based on equipment developed in Hollywood in the 1920s to support the motion picture industry. They were remarkably efficient and capable of astonishing production rates – well in excess of 1,000,000 prints were made between June 1944 and May 1945.

Each vehicle was manned by two shifts of four photographers who stayed together throughout the life of the unit. As a result, they became very skilled and could process and print films in a remarkably short time and, when necessary, 24 hours a day. Many special techniques



*The ubiquitous Williamson  
Continuous Processing  
Machine*

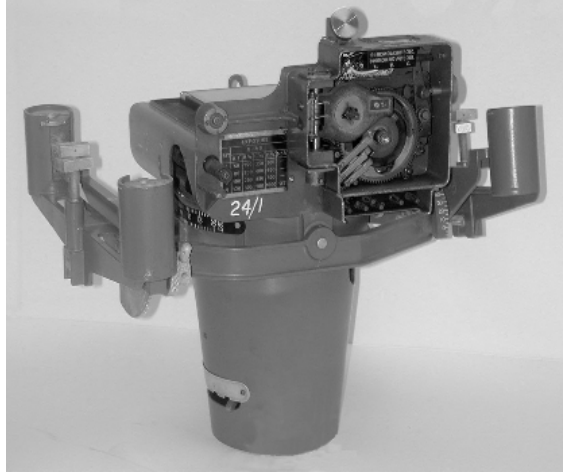
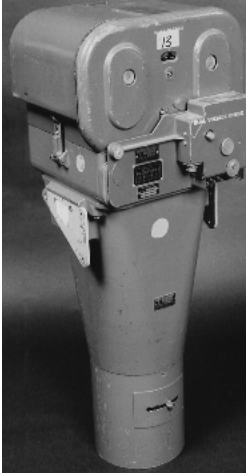
were devised and, despite the need for speed, the quality of the photographs produced was invariably very good. It was testament to the quality of its product that, in November 1944, when an American unit in Belgium that was having problems operating similar equipment, sought the advice of the British, 2nd TAF asked No 7 MFPS to provide appropriate advice.

Apart from its specialised vehicles, an MFPS convoy included a water bowser, a mobile office, two Austin petrol generator vans and a Harley-Davidson motorcycle. The original generators were not very successful and they were soon

replaced by a single diesel generator mounted on a lorry chassis.

Most of the airmen in the MFPS were conscripts who had volunteered for the RAF and, since many were experienced photographers, their professional knowledge made them an extremely competent team. They were highly motivated and, as a result, disciplinary problems simply did not arise. Their attitude was that the aircrew were risking their necks to obtain the photographs and that it was, therefore, up to the ground staff to support them to the maximum.

When the weather was good (and there seemed to be many cloudless days in 1943) the MFPS was inundated with work. Each aircraft normally carried two F52 cameras, which took pictures with a 60% overlap so that prints could be viewed in stereo – in effect ‘3D’. The F52s carried 500-exposure magazines, so, allowing for several aircraft flying two sorties each, the MFPS could sometimes be faced with processing as many as 40,000 negatives a day. As time went on, the demand for prints by various intelligence organisations increased; so that ‘eight off’ from each print was frequently required. This could result in up to 160,000 prints being made within twenty-four hours. In addition, smaller F24 cameras were often carried and



*Two of the cameras that constituted the basic tools of RAF airborne photography during WW II, left, the F52 and, right, the F.24.*

these were included in the general production.

Another camera that was used was an American Fairchild. This used a 9"×9" format film which was particularly suitable for map-making. This involved using dimensionally-stable 'topographical base' film. The negatives had to be printed by hand, since the multiprinter machines tended to stretch and distort the paper. On some occasions infrared film was used. This took the range of film sensitivity into the near infrared portion of the spectrum and, among other things, increased the possibility of detecting camouflaged vehicles and installations.

Before the end of 1943, No 34 Wg had begun to acquire new aircraft; Spitfire XIs for No 16 Sqn and Mosquito IXs and XVIs for No 140 Sqn and in the spring of 1944 the whole organization moved to Northolt. There the wing was joined by No 69 Sqn, which specialised in night photography using Wellington XIIIs, requiring No 7 MFPS to widen its expertise even further.

Night photography involved dropping a series of twelve 'pistol-flashes' synchronised with a special version of the F24 camera, the aim being to record, for instance, nocturnal movements of enemy vehicles. Unfortunately, the line of flashes also revealed the presence of the aircraft and made it all too easy for enemy AA gunners to



*By 1943 the most prolific of the wartime PR variants of the Spitfire and Mosquito were entering service, represented here by, a Mk XI of No 400 Sqn (above) and (below) a Mk XVI of No 140 Sqn.*



predict its position thus increasing its vulnerability. It is suspected that this will have accounted for several of the ten Wellingtons which failed to return in the twelve months that No 69 Sqn was with No 34 Wg. At least one of these was actually brought down by friendly AA fire, while a number of other aircraft sustained damage from *Flak*. Despite these losses, however, the squadron brought back many impressive and extremely valuable photographs of *Wehrmacht* armoured units on the move at night.

No 7 MFPS was at Northolt for only a few weeks before D-Day arrived and in August 1944 it crossed the Channel to land on JUNO beach at night and in rough weather. The unit's convoy spent the night



*Part of No 7 MFPS's convoy crossing the Channel in August 1944.*

at Landing Ground B8 before moving on to A12, near Balleroy. It was there for only a week, following HQ 34 Wg to a former *Luftwaffe* airfield near Amiens, B48, Glisy, on 8 September. In his account of this journey James Marett noted that:

‘The route we travelled took us through St Lo and Caen, where the devastation was fantastic, far worse than anything I had seen during the *Blitz* in London. The roads through these towns consisted solely of channels cut by bulldozers through the piles of bricks and rubble and one wondered how any of the population had survived.’

Amiens/Glisy was an interesting location for the wing, as it appeared that the *Luftwaffe* had departed in considerable haste, leaving a good deal of equipment behind. The MFPS set up shop near some woods on the edge of the airfield and during its time there it was involved in, among other things, processing photographic coverage of the ill-fated Arnhem operation.

Following the progress of the Allied forces, the unit moved again in late September, this time into Belgium, to B58, Melsbroek, a few

miles north east of Brussels. There it established itself just inside the main entrance to the airfield on the Brussels/Haacht road, where it was soon joined by No 1 MFPS whose main task was to make thousands of reprints from existing negatives, mainly those taken by the squadrons of No 34 Wg. They also made very big enlargements for map-making, using a large camera mounted in one of their vehicles.

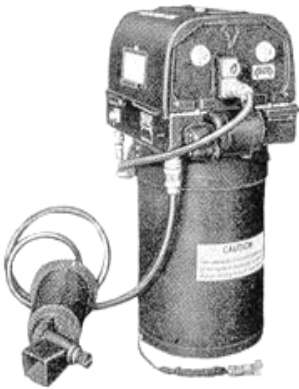
The capture of most of the Channel coast meant that the Germans were no longer able to launch their V1 flying bombs at London and south-east England. They had very large stocks of these, however (the original intention had been to launch 2,000 of these at London every 24 hours, which hardly bears thinking about), so from October onwards they began launching V1s at Brussels and Antwerp. One of these exploded 200 metres from the MFPS site and several airmen were severely injured.

In December 1944 there was a long spell of particularly bad weather in Belgium and Holland, with low cloud and frequent snow falls. This resulted in very few high-altitude reconnaissance flights; enabling Von Rundstedt to build up his forces for the 'Battle of the Bulge' undetected. Eventually, just before Christmas, the skies cleared and every Spitfire and Mosquito available to No 34 Wg began flying photographic sorties. The workload exceeded anything previously experienced. To cope with the production demands, the MFPS worked day and night, with overlapping shifts. This work included the films exposed at night by No 69 Sqn's Wellingtons, now joined by No 140 Sqn's Mosquitos. Vital photographs of Von Rundstedt's deployments were taken and his supply lines were hammered by British and American medium bombers to halt his advance.

At dawn on New Years Day 1945, the Germans launched Operation *Bodenplatte*, a large scale strike aimed at US and British airfields. Substantial damage was inflicted at Melsbroek where many aircraft were destroyed on the ground, including eleven of No 69 Sqn's Wellingtons. No 7 MFPS was fortunate to escape unscathed but No 1 MFPS, which was located on the other side of the road, was hit and suffered many casualties.

During the early part of 1945, despite severe weather, 21st Army Group kept up the pressure on the defenders of the Third Reich. Throughout January, February and into March the Canadians and British battled their way into the Hochwald and Reichswald Forests.





*The Fairchild K-19 flash camera.*

During this period, the number of night sorties increased significantly. No 140 Sqn's Mosquitos were taking their photographs from about 4,000 feet, using a Fairchild flash camera. The films were difficult to print because the flashes went off well behind the aircraft. The effect was to light the ground from one side, causing half of the negative to be overexposed while the other was underexposed. To begin with this could only be compensated for by hand-processing, a time-consuming procedure, requiring considerable skill. However, the staff of No 7 MFPS were able to devise a technique

for machine processing which gave extremely good results and saved vital minutes.

Eventually, on 24 March, the Rhine was crossed in the northern sector (the US Army had already crossed further south by means of the Remagen Bridge). Every available 2nd TAF aircraft was tasked from dawn till dusk. This resulted in another hectic session of day and night film processing and printing, but it was the last of these as far as No 7 MFPS was concerned. Shortly after this, the wing moved into Holland, to B78, Eindhoven.

In addition to its aerial photography work, the staff of the MFPS were sometimes required to provide photographic coverage of current events on behalf of the Air Ministry Public Relations Unit. One of these involved a trip to the notorious Belsen concentration camp immediately after units of the British Army had reached it. What the MFPS staff saw there was horrific and is well documented elsewhere.

Following the ending of the European war in May 1945, instead of moving forward into Germany, No 34 Wg remained at Eindhoven. No 7 MFPS's first major post-war task was to process and print infrared films taken by No 140 Sqn, in superb weather, of the whole of Holland. This was at the behest of the Dutch Government who needed to be able to document the extent of flooding and war damage, much of which had been caused by the German's destruction of flood

control gates.

Not long after this, the personnel of No 16 Sqn and No 7 MFPS were summoned to a meeting in an empty hangar. An 'Admin' squadron leader, strode onto a stage at the end of the hangar to announce that, while he understood that 16 Squadron (including No 7 MFPS) had put up a fair show in Europe, it would now be 'reduced to cadre'. This casual dismissal of the MFPS's efforts in WW II was, to say the least, disappointing. The unit had worked unceasingly to make 34 Wing's operations a success and it had demonstrated the highest technical and professional standards while doing so.

Meanwhile, many of No 7 MFPS's older members had already begun to be repatriated prior to demobilisation, but the bulk of the unit's personnel were still liable for further service and the unit was earmarked for deployment to the Far East. Its vehicles were, therefore, carefully packed ready for the long drive, via a night stop at Armentières, to Calais and the car ferry to Dover. The convoy was waved through Customs, which was fortunate, as there were large numbers of German Luger pistols, SS ceremonial knives and so on tucked away, which the chaps had 'acquired'. The first overnight stay was in Stevenage, followed by a night on Doncaster Racecourse before the unit reached its ultimate destination – Acklington.

There was little for the unit to do while plans went ahead for its move to the Far East. It was expecting to receive new processing vehicles and equipment before embarking on an aircraft carrier from which it was to be landed on the coast of Malaya, prior to the recapture of Singapore. Then, early in August, came the news of the dropping of the atomic bombs on Hiroshima and Nagasaki, followed by the surrender of Japan and the decision that the unit would not be deploying overseas after all. Before the end of the month it had been disbanded and its personnel dispersed.

There were only nine MFPSs, most of them having a relatively short existence, although No 4 carried on operating in Germany for some years after WW II. There were two other reconnaissance wings in 2nd TAF, Nos 35 and 39 Wgs, each of which were supported by their own MFPSs. These wings were more concerned with tactical work and less involved in night operations. No 3 MFPS supported 8th Army's operations, particularly in Italy where, in 1944 alone, they produced more than three million prints (half a million in just one



*No 3 MFPS's convoy on the road past Cassino.*

month!); the story of their trek across North Africa and on through Italy is another tale of success and professional achievement – but the telling of this one will have to await another occasion.

### **Conclusion.**

In conclusion, it is self-evident that the support provided by all Mobile Field Photographic Sections to the reconnaissance squadrons was an essential prerequisite to mission success. In addition to the maintenance and fitting of cameras, they developed films and prints with remarkable speed, showing all of the ingenuity and skill of very experienced, professional, photographic engineers. Their output was prodigious and the quality of their product remarkable. Moreover, the logistics of supplying them with film, chemicals and spares in a wartime environment was often a nightmare, but the MFPSs were always able to deliver the goods – so the support that they had provided had clearly been matched by the support that they themselves had received.

## AFTERNOON DISCUSSION PERIOD

**Jefford.** Mickey – as I recall, when the guns were installed at Tengah, during Confrontation, the Regiment was deployed on the airfield itself while the Army's guns were sited well outside the perimeter and were radar-laid. In your presentation you mentioned the remarkable number of V1s that were shot down by guns, many of those I think were also radar-laid. Did the Regiment not get into the radar game?

**Air Cdre Mickey Witherow.** I'm glad you asked that – I had planned to cover radar, but I just didn't have room for it in my allotted time. Taking the second point first – there were no radar-laid guns until quite late in WW II. At least, not *automatically* laid. Modern 'fire control systems' did not really become a practical proposition until the advent of digital computers. That said, radar-based 'predictors' began to be introduced from as early as 1939 and in 1944 the Army acquired some quite sophisticated American AA radars which it used against V1s, primarily in association with its 3.7" guns – but not with the RAF Regiment's 40mm Bofors. That said, despite the accuracy provided by radar, apart from those using the American kit, the actual gun-laying still had to be done manually in response to visual cues generated by an analogue computer.

Did the Regiment ever use radar for gun-laying? In short – no, not for gun-laying nor for fire-control of guns. It did however use RAF surveillance radars to detect targets for the guns. Indeed each LLAD gun squadron had an established officer (the LLAD Exec) whose job was to give warning and direction to the guns and the forward observation posts (OPs) simultaneously, of distant approaching aircraft as indicated by the surveillance radars. The OPs, 3,500 to 4,000 yards out, subsequently reported their sightings to the guns of approachers within a 45° arc, allowing timely laying.

So, since the Army did use fire-control radar, why didn't the RAF? It's a tactical issue. In broad terms, an Army is strung out along a defensive line, a front; in the case of the V1s, for instance, a coast, which enemy air needs to cross on its way to high value targets in the rear. Army AAA, therefore, confronts oncoming aircraft intent on crossing a narrow gun belt in the shortest possible time, so they will tend to fly fast but with minimum manoeuvring. This makes their

trajectory relatively predictable (like that of a V1) and thus they are vulnerable to a fire control system that can process radar-derived data rapidly enough to produce a firing solution that can be used to aim a gun, and a computer, even an analogue computer, like the Fire Control Equipment (FCE) Mk 7 – originally called YELLOW FEVER introduced in the late 1950s – can cope with that. Moreover, FCE 7 had a range-calculator, which none of its predecessors had, allowing it to open fire automatically at the optimum moment for the optimum length of time. The gunners simply fed in the ammunition and made overriding decisions on fire discipline, battle procedures, etc.

By contrast, the RAF Regiment's guns were normally deployed about and on an airfield, in depth.. In effect, therefore, its guns were relatively close to, indeed often part of, the high value target. In their case the attackers would almost certainly have been manoeuvring – typically, in the Indonesian Confrontation era, the classic pull up into a wingover from a point 'two-miles off and two-miles back'. That meant that the aircraft would be constantly changing its speed, altitude, heading and aspect, which made it virtually impossible for a computer, at least an analogue computer, to predict what it would do next, and thus where to aim the guns. We were better off tracking the target visually.

There is another factor worth mentioning. Because, when dealing with a *non*-manoeuvring target, the calculations are relatively simple, the sums can be done more quickly and the result is, in effect, to roughly double the engagement range. That is why, in the Tengah case, it would have made sense to site the Royal Artillery's guns at a greater distance from the airfield, on the coast, where, assisted by radar, they could engage the enemy while still en route, leaving the Regiment to deal with those which got through to fly their attack profiles.

**Air Cdre Graham Pitchfork.** Peter, was there any effort made to salvage and repair enemy aircraft, so that we could assess them?

**AVM Peter Dye.** Yes. One unfortunate consequence, of course, is that museums like this one are hard-pressed to find examples of intact enemy aircraft, because we tended to dissect them. Nevertheless, Farnborough received a significant number of aircraft, some of which were even made airworthy. But the majority of German aircraft were

simply reduced to produce.

**Mike Meech.** With reference to the Servicing Commandos, something along those lines began in WW I among the units assigned to support the cavalry. That is to say, those which, from 1916 onwards, were expected to move forward with the troops, mainly Nos 6, 18 and 35 Sqns. On No 35 Sqn, for instance, it was intended that an aeroplane would be supported by a fitter and a rigger who would go forward on horseback, with spares carried by a pack horse and fuel in a horse-drawn wagon. By 1918, it was envisaged that the whole squadron would move forward in motor vehicles. On No 6 Sqn the CO decided to do without the established tentage and rely on the facilities on captured enemy airfields in an advance or on friendly airfields to the rear during a retreat.

**Sir Freddie Sowrey.** Further to the question about salvaging enemy aircraft, Ronald Kellett, who was a Battle of Britain pilot and my Squadron Commander just after the war, spent the last two years of the war in Turkey. He told me that the Turks had Heinkel 111s and they had found that the best source of spares for them was the Royal Air Force! It appears that our maintenance units were able to provide recovered DB engines and any other spares that were required.

**Richard Bateson.** An intriguing aspect of salvage was a drive in the autumn of 1940 to collect MG15 and MG17 7.92mm machine guns from German aircraft that had been shot down. After reconditioning, they were mounted in pairs on a Motley mounting and issued to selected Army units for low-level air defence. By June 1941 some 900 such guns had been recovered but problems with the provision of spares, caused by souvenir hunters, ended the programme. I do not know of any recorded incident in which a *Luftwaffe* aircraft was shot down by one of these guns. I wondered whether anyone could enlarge on that.

**Dye.** No. I wasn't aware of that practice, but it was as pragmatic as taking some of the Bovington Tank Museum's collection and using it for point defence – 'Little Willy' of 1915 is said to have been given a second lease of life as an anti-invasion strongpoint. The situation in 1940 would certainly have justified the use of any recovered war material, either to be recycled into new production or to be pressed

into service to replace some of what the Army had lost at Dunkirk. As I said, I wasn't aware of it, but it does make sense.

I also applaud the entrepreneurial initiative highlighted by Sir Freddie – selling to users of German aircraft spares that we had recovered. The wider point, however, is that, given the inevitable problems associated with sourcing raw materials in wartime, salvage was essential. I doubt that our war effort could have been sustained without it.

**Sir Michael Alcock.** It would seem that the Royal Air Force could reasonably claim to have been the originators of the 'recycling' which is now such a feature of our everyday life!

**Christopher Shores.** A question for Air Cdre Witherow. I had believed, until recently, that the use of PAC units to defend airfields against low-level attack had been confined to this country. I recently discovered that in North Africa in 1941 an Italian fighter unit making a strafing attack on the airfield at Sidi Barrani found itself facing what was obviously a PAC barrage which even managed to damage one of the aircraft. So far as I have been able to ascertain, this seems to have been the only time that the Axis came up against this weapon. Have you any idea how it came to be there?

**Witherow.** I'm afraid not. The Battle of Britain incident that I described was one of the very few successes claimed by the PAC and it was only in service for about eighteen months. Its fixed siting made it too inflexible. Like the Defiant, it initially caught the enemy by surprise but, once they could identify its weakness, it had to be withdrawn – the PAC was a Defiant in AA terms. I had no idea that it had been deployed in North Africa but the Navy certainly used the PAC, and they claimed two or three aircraft with it. Although the Royal Navy shot down more British aircraft than German ones! (*Laughter*). It's true! Mostly naval ones!

**Stephen Mason.** Would aircrew have known when they were flying an aircraft that had been wrecked, recovered and rebuilt?

**Dye.** I don't think that they would, and, so long as the aeroplane was serviceable, I don't think that it would have mattered to them. They were certainly aware of the salvage programme, though. It has been said that, during the Battle of Britain, pilots were advised which

airfields to land at in the event that their aircraft had sustained damage. That sounds just a bit too calculated to me. I would have thought that, under the circumstances, their main concern would have been to get down in one piece – at the nearest available place. But the intention was clearly, where possible, to recover a damaged aeroplane to the airfield that was best able to cope with dismantling and transporting it. There was a good deal of publicity given to the salvage programme so that everyone, including aircrew, was aware of it and able to play their part. I recently saw an interview with a Battle of Britain pilot who was asked directly, whether they had ever suffered from a lack of aircraft. To which he replied, ‘No. Never.’ And I think that there was an implicit understanding that he and his colleagues knew that there was an immense system supporting them.

During the First World War, it was recorded that squadrons actually preferred engines that had been repaired by the Engine Repair Shops as they had more confidence in their reliability compared to engines provided directly from the manufacturers where high dilution levels (the proportion of unskilled to skilled labour) led to unreliability. In the Second World War, because modifications were difficult to incorporate on the production line, they were largely incorporated by ground parties from No 43 Group. As a result, squadrons had good reason to believe that an aircraft repaired by the CRO was not only serviceable but was also more up to date (in terms of operational modifications) than one straight from the production line.

**AVM Nigel Baldwin.** This a bit tangential but, parked outside a hangar at Brooklands is the fuselage of the Swift in which Mike Lithgow took the air speed record from Neville Duke’s Hunter. It looks a bit sad, without any wings. Is there any chance that, with your Museum Director’s ‘Repair and Salvage’ hat on, you might be able to do anything about that?

**Dye.** The Museum already has a Swift which is currently on loan to, I believe. Tangmere, so we don’t have a pressing interest in the example at Brooklands. The airframe concerned was, as I recall, for a long time in private hands so it is good to see it in public view. That said, it has been argued that there should be a ‘national collection’ that ensures that important artefacts are preserved – ideally under cover. Where



they are located is not significant. The British Aircraft Preservation Council (BAPC) has endeavoured to identify, and keep tabs on, key elements of our aviation heritage. So, while the Lithgow Swift belongs to another museum, and has nothing to do with the RAF Museum, we are aware of it and are pleased to see that it is now with an organisation that intends to look after it.

That said, looking after such artefacts is a considerable challenge, not least because leaving them outside is tantamount to scrapping them slowly. The RAF Museum is committed, in the long-term, to having all our collection under cover, because we do not consider that we are properly meeting our obligations until we do so. However, this requires money and resources and the Ministry of Defence simply does not have the funds it needs to assist us in this respect – indeed it doesn't have enough resources, full stop.

I'm not sure whether that really answers your question. What I am trying to get across is that we need a coherent policy regarding the national aviation heritage and some way of agreeing a scheme that will preserve what is important, regardless of who actually 'owns' any particular artefact or where it is located.

**Tony Raybone.** Just an anecdotal comment. I have engraved on my memory, as a child growing up during WW II, the image of the ubiquitous Queen Mary, very often drawn by a Bedford tractor unit, loaded with bits of aeroplane. It is an abiding image – and one which seems to encapsulate the whole Repair and Salvage business.



*A classic wartime image – the iconic Queen Mary 'loaded with bits of aeroplane' – Wellington R3224 of No 75 Sqn.*

## **AN OVERVIEW OF AIRFIELD CONSTRUCTION PRIOR TO AND DURING WW II.**

**This paper was presented by Sebastian Cox BA MA, Head of the Air Historical Branch (RAF), to members of the Royal Air Force Airfield Construction Officers Association on the occasion of their Sixty-First Annual Reunion, 18 November 2006.**

Ladies and Gentlemen, may I first say what a pleasure it is to be asked to address you today because, as the RAF's senior historian, I greatly admire the work done by the Branch over many years. John Browne asked me if I would give you a short talk on any topic which I thought might be of interest to the Association so I have chosen as my theme a subject which I hope will strike a chord, namely the construction of airfields, particularly in the UK, but also in other theatres during the Second World War. I will look at the Expansion Period, the Early War Period, the Later War developments and the part played by both civil contractors and the ACB.

If you look at a map of Eastern England in 1923, 1934 (the start of what became known as the Expansion Period) and 1944 you will rapidly appreciate that some pretty wholesale changes were introduced to the landscape. In 1923 the RAF had just two aerodromes for operational squadrons in that part of the country, Bircham Newton, near Kings Lynn, and Duxford near Cambridge. In the 1923 scheme for a 52-squadron Air Force – never, incidentally, implemented before Hitler came to power ten years later – although some bases were slated for Eastern England not one was scheduled to be built in Yorkshire or Lincolnshire. Instead the thirty-five bomber squadrons were to be in Oxfordshire, Gloucestershire, Hampshire and Wiltshire. There were to be just three airfields in Norfolk and one in Suffolk. The seventeen fighter squadrons were to be in the south, with the most northerly fighter station in the country being Duxford, comfortably south of a line from the Wash to the Severn Estuary. Thus, when Hitler came to power the RAF faced in one direction only, southwards, towards the then traditional enemy, and the only one at that point with an air force within range, namely France.

In 1934 the Government, increasingly concerned by both Japanese and German militarism, voted modest increases. In the Air Estimates Vote 4 – Works and Buildings for the RAF – increased from £2.75M

in 1934 to £6.75M in 1936-37 and, as concern over Hitler grew apace, £18.5M in 1937-38. By July 1939, one month before war broke out, the Vote 4 Estimate was £65M, more than three times the cost of the entire RAF in 1934. For a rough equivalence to today's prices you should multiply these figures by a factor of 31.

The Air Estimates tell us not only that there was a rapid and large-scale expansion of the RAF's infrastructure, but also that the entire orientation of the country's air effort was switched from south to east. Thus some RAF stations whose names were to become familiar over the years made their first appearance – in the 1935-36 Estimates, Marham in Norfolk, two new stations, Stradishall and Feltwell in Suffolk, two more in Lincolnshire, Waddington and Manby, and a new station in Yorkshire, Church Fenton, along with an expansion of Catterick. In the next year Yorkshire is prominent with Dishforth, Driffield and Leconfield, and Lincolnshire sees work start on Hemswell and Scampton. Huntingdonshire makes its first appearance with Upwood and Wyton, and Essex gets a new fighter station at Debden. In the remaining years before the war, West Raynham, Bassingbourn, Cottesmore, Finningley, Coningsby, Wattisham, Coltishall, Langham, Leeming, Topcliffe, Binbrook, Kirton-in-Lindsey, are all brought into being.

Plans for war are very definitely aimed at Germany. The orientation of the newly created Bomber Command saw the Handley Page Hampdens on Lincolnshire airfields, the Whitleys in Yorkshire, the Wellingtons and Blenheims in Norfolk and Suffolk, more Blenheims in the East Midlands and the Battles in Oxfordshire. Of course, there were at this time no heavy four-engined Stirlings, Halifaxes or Lancasters, the first specifications for which were only issued in 1936. It is easy to forget the scale of the aeronautical revolution which took place in the 1930s. The Wellington, Blenheim and Whitley were themselves a step-change in performance from the biplanes which predominated when Hitler came to power in 1933, but they were themselves quickly overtaken by the four-engined heavies. Thus the Wellington, the heaviest bomber in service in 1939, had an all up weight of 30,000lbs with a wingspan of 86 feet. By 1944 the Lancaster had an all up weight of 68,000lbs and a wingspan of 102 feet. The provision of suitable bases for these aircraft was nevertheless beginning to weigh heavily, if you will pardon the pun, on the minds

of the planners.

These bases created expensive headaches for the airfield engineers. Whilst you might operate a Blenheim from a grass surface, at least in good weather, the prospect of operating a heavy bomber with an all up weight of nearly 70,000lbs from a grass strip was clearly impossible, at least on a regular and consistent basis in summer and winter. You would receive a poor return for your investment if you tried.

The revolutions in aircraft design, therefore, had to be matched by revolutionary developments in the airfields they flew from. Thus, although I have outlined to you the rapid expansion of airfields in the Eastern Counties of England as war approached, they were, in fact, in some though not all senses, inadequate for the task, both in number and in facilities. What was adequate for a Blenheim or even a Wellington squadron would not meet the requirements of the later wartime aircraft.

What do I mean by that? Well, if you look at the expansion stations, much of the initial provision subsequently proved inadequate both in scope and scale. Despite the apparently massive increase in investment, the new airfields were neither numerous enough nor large enough for wartime needs. For example, in 1940 the average establishment figure for a parent bomber station was 1,134 and for a satellite 586. By May 1945, the parent station establishment totalled 2,500. In 1940 the standard dimensions for the runways on a bomber station were three runways, each 1,000 yards by 50 yards. By war's end, the main runway was 2,000 yards and the two subsidiaries 1,400 yards, and some stations were being prepared with 3,000 yard runways. Furthermore, runway approaches pre-war had to be cleared of obstructions to accommodate an angle of descent of 1:30, perfectly adequate for pre-war aircraft, but the bigger heavier types entering service during the war needed the approaches cleared to descend at 1:50.

So even the apparently impressive pre-war increase in funding, though admittedly starting from a very low base, was soon to prove entirely inadequate. In 1939, for example only nine new airfields were built with runways. In 1940, the figure rose to 40, but those runways, of course, would have been too short. In May 1941, it cost £500,000 to complete a fighter station; by May 1945 that had risen to £900,000, and bombers stations were even more expensive. Thus very soon

wartime expenditure spiralled to unheard of heights. In 1941, £125M was spent on constructional works for the RAF; in 1942 it was £145M and in 1943 £126M. The 1942 figure of £145M compares with a typical peacetime National Budget in the 1930s of £900M. £145M represented £400,000 a day at 1940s prices. The equivalent in 2005 prices is £4.5Bn a year – £12.4M a day. The daily wartime expenditure was estimated at £12-14M per day in 1942, so RAF infrastructure was consuming 1/32nd of that daily total. Then, as now, air warfare did not come cheap.

So where did all the money go? Well, in 1939 there were 158 RAF airfields covering 85,736 acres of land in the UK. By 1942 there were 421 RAF airfields and 75 USAAF airfields covering 258,352 acres, and in 1944 there were 490 RAF airfields and 133 American airfields covering 333,259 acres – the equivalent of ten cities the size of Edinburgh (32,000 acres) in 1945. During the peak year of 1942, the civil engineering effort involved in the airfield construction and extension programme employed 127,000 building and engineering workers out of 393,400 available in the country. The Works Directorate of the Air Ministry was thus employing nearly one third of the country's available construction manpower on works for the RAF and USAAF. Apart from building new stations, nearly every existing RAF station was expanded and altered, not least in the provision on most of them of runways, concrete taxiways and hardstandings and dispersals, all of which were almost unheard of in the pre-expansion era. In all some 175 million square yards of concrete and tarmac were laid which would give you a 30ft wide road stretching for nearly 10,000 miles, or you could just concrete over nearly the entire 1945 city of Birmingham.

Enormous though the airfield building programme in the UK was before and during the Second World War it is only part of the story because, as you all know, airfields themselves are only part of the infrastructure necessary to support an air force in combat. To ensure that these hundreds of airfields were able to deliver what we would now term combat effect, there were some 300 major non-airfield facilities built between 1939 and 1945 to provide the bombs, fuel and spare parts in the enormous quantities needed. A Lancaster's maximum fuel capacity was 2,154 gallons of 100 octane fuel, and its maximum normal bomb load was 14,000lbs.

These facilities included such unique engineering constructions as the large reserve bomb and incendiary depots and advanced ammunition parks which provided storage for 450,000 tons of explosives and bombs. Some forty-one such depots were built, the main reserves stores being underground which involved excavation and mining problems of an unusual sort. One of these, constructed inside a former quarry and gypsum mine at Fauld in Staffordshire famously exploded in 1944 killing a number of people including the poor unfortunate farmer and his wife whose farm stood above the depot workings and which completely vanished. The enormous crater is still there, surrounded by barbed wire and warning notices and subject to an annual inspection by the EOD experts. The total cost of ammunition storage depots was £6M.

Then there were the reserve distribution and storage depots for aviation fuel and lubricating oil; total capacity was precisely 2,090,700 tons distributed across thirty-six main reserve and forty-two distribution depots. Again, several of the largest main reserve depots were specially constructed in buried and completely protected installations, and underground installations with a lesser protective value were also provided for the distribution depots. All of this involved overcoming unusual design and engineering problems in the construction of the tanks, pumps and loading facilities. They cost another £12M.

There were seven main aircraft equipment depots, six main ground equipment depots and fifteen equipment parks, not to mention the 560 aerial masts from 100 to 500 feet high provided for the Chain Home radar stations. I have not even mentioned the schools of technical training, hospitals, nor the underground command bunkers such as Bentley Priory or Uxbridge.

The civil engineering achievements of the Air Ministry in conjunction with the UK civil engineering industry appear to me to be one of the great unsung achievements of the Second World War. They dwarf the supposedly mammoth building and development projects for the London Olympic Games and were delivered to timescales often far more rigorous and demanding. They had none of the advantages of modern computer design systems. What is more, a fair amount of this infrastructure is still in use in one way or another, and given the urgency of the situation I am amazed by not only the

durability of much that was built but also by the quality and elegance. Many of the expansion stations contain very fine buildings, and it is not often appreciated that those elegant expansion facades, such as the officers' messes at Marham say, or Waddington, or Coningsby, were designed by the Air Ministry Works Department but approved by the Royal Fine Arts Commission and, at least pre-war, their disposition around the countryside was also approved by the Society, later the Council, for the Preservation of Rural England. They are attractive buildings in their own right and despite, as it were, their emergency nature, they were built to look good and to last. I do not think it is a coincidence that many former RAF stations from the period, such as Wattisham and Hullavington, have been taken over by the Army who greatly appreciate the quality of their inheritance. Not all building was like that of course, the miles of Nissen or wooden huts – 110 million square feet of pre-fabricated hutting – that sprang up being an example, though even some of those survive; RAF Northolt's Police Dog Section still to this day occupies the Nissen huts erected to house the Polish fighter pilots at their dispersal.

All of this programme, of course, was designed and managed by the Air Ministry Directorate of Works. It is fashionable these days to decry the efforts of Government to institute and manage such programmes and to suggest that only private industry has the necessary skills. The Second World War experience suggests that there is no real reason why such skills cannot be developed and utilised by Government if the will exists.

Which brings me to the second part of my lecture today in which I want to concentrate on the parallel achievements of your Branch: the uniformed partners of those toiling 100,000 plus civilians.

As some of you may know, the origins of the Airfield Construction Branch lie in the unsuccessful 1940 campaign in France. It is not often appreciated how late in the day the British Government committed itself to any large scale support for its continental ally. Neville Chamberlain's Government essentially believed that the massive programme of Air Force expansion, the infrastructure for which you have just heard about, would prove a deterrent to Nazi aggression and that this, along with a diplomatic offensive designed to meet Hitler's 'reasonable' claims, would successfully avert war. This was the road to the Munich Agreement, signed in the autumn of 1938. Munich, you

will remember effectively dismembered Czechoslovakia, and ceded the German-speaking Sudetenland to Germany. In March of the following year the Germans occupied Prague and the rest of the country. At that point Chamberlain understood that his previous policy had failed, that Hitler could not be bought off or appeased, and that he was bent on territorial expansion which had nothing to do with the 'reasonable' claims of German speakers elsewhere. The British Government did a *volte face* which saw peacetime conscription introduced for the first time and a commitment to sending a British Army of two corps to France in the event of war, as opposed to the handful of divisions previously offered.

Whilst politically sensible, if perhaps belated, this reversed previous grand strategic policy. A large British Army in France would require air support, and it thus would also need aerodromes, including training fields away from the frontline. The Air Ministry formed a unit to oversee the engineering works in France named, rather prosaically, No 1 Works Area (France). This unit supervised the construction of three major and a number of minor aerodromes, mostly built by civil contractors. When the German invasion in May 1940 precipitated the French collapse the contractors fled, and the unit was evacuated under fire from St Nazaire. Back in the UK, the personnel from this unit were dispersed around RAF airfields in time for the Battle of Britain where they supervised what we would now term Rapid Airfield Repair Units, often Army pioneers. The success of this policy, together with the shortage of suitable Army personnel to support the work, led to the formation of the first of the RAF Works Flights which were later to metamorphose into the Airfield Construction Service Squadrons. The original squadrons provided assistance and expertise in the early years to assist the civil engineering industry in the massive construction programme I have outlined.

Eventually specialist squadrons were formed, including RAF Plant Squadrons equipped with the most modern plant and machinery then available who were trained at the ACS's own school – No 2 School of Airfield Construction – in part on machinery provided by a local contractor free of charge. Other specialist units followed, including Plant Repair Squadrons and a raft of specialist flights including:

Mechanical and Electrical Construction Flights



## Mechanical and Electrical Flights

Quarrying Flights – to develop local resources to provide stone, hardcore and so forth for airfields, and

Well-Boring Flights (the name of which my nineteen year old daughter found highly amusing).

The ACS was instrumental in assisting with the major infrastructure programme in the UK, particularly that for Bomber Command, but their most important contribution in this country was undoubtedly the construction of no fewer than twenty Advanced Landing Grounds along the Kent, Sussex and Hampshire coasts from which the fighter and fighter bomber assets of the 2nd Tactical Air Force would fly in support of the D-Day invasion until such time as we could build new airfields in the bridgehead. Each of these ALGs required the shifting of 10,000 tons of earth; the laying of two runways, each  $1,600 \times 50$  yards in metal track; eighty metal track aircraft standings; two and a half miles of perimeter track, and two and a half miles of roadway; eight blister hangars; and storage for 18,000 gallons of petrol. Each landing ground was built by three officers and 200 airmen from the ACS, and the scheduled time from turning the first sod to flying-in the first aircraft was three months. All were ready in time, and whilst the aircrew, and possibly some of you, do not remember them with great affection, they served their purpose very well, not least when the slow progress made by the Army in expanding the initial bridgehead meant that the airfield building programme in France fell behind. One of the two fighter bomber groups scheduled to transfer to the Continent continued to operate from the UK strips well into August of 1944 as a result.

The other major commitment of the ACS in the UK in 1944 was to prepare some 2,000 balloon sites along the South Coast to counter the V1 threat. The original 500 sites were completed before the first V1 arrived a week after D-Day, but the powers that be quickly decided to deploy many more balloons and a further 1,600 sites were prepared by the ACS within 25 days, twelve days less than the time allotted.

Once the armies had a major foothold in Europe the ACS, in company with Airfield Construction Units of the Royal Engineers, deployed onto the Continent. The combined RE/ACS total was about

16,300 personnel, of whom two thirds were RAF. They built a string of airfields from scratch and also repaired, improved and extended captured *Luftwaffe* bases. To this day, if you tour Normandy you will see lengths of steel mesh tracking taken from these aerodromes being used as fences by Norman farmers. A little rusty perhaps but still proving very serviceable for its new purpose.

The ACS Wings were nothing if not flexible, and one of the more unusual task they undertook was the street clearance of the town of Condé. No 5357 Wg was called in when the Army, having requested the USAAF to blitz the town with heavy bombers, found that the heaps of rubble that this had created had effectively blocked all of the roads. The Army wanted two routes cleared and, by following the path of the shorn off telegraph poles and the occasional glimpse of a kerbstone, the wing's bulldozers were able to clear the required paths within 36 hours, which allowed the armour to stream through in pursuit of the Germans.

During the Arnhem landings No 5357 Wg followed up the attacking ground units of 30 Corps, moved into Eindhoven airfield and had a functioning landing strip and taxiway available for the Typhoons within 36 hours. This was important because the latter had previously been operating from Northern French airfields at the extremity of their range. The wing continued to work on improving the facilities at Eindhoven which had suffered extensive damage from Allied bombing and German demolition, not to mention the fact that the local Dutch engineers who had been forced by the Germans to work on improving the airfield's facilities had purposely laid incorrect drainage falls to create frequent flooding – which doesn't say much for the supervisory capacity of the ACS's German opposite numbers.

The winter of 1944-45 in Holland and Belgium was a hard one, and the ACS units struggled against the elements to keep the 2TAF airfields serviceable. Although the unit diaries of the squadrons occasionally refer to their airfield surfaces being unserviceable due to weather, there is little doubt that the ACS performed near miracles in keeping them operating at all in the prevalent conditions.

In other theatres the ACS was equally active. At Gibraltar they built a 1,100-yard extension to the main runway. This extended out into the sea and utilised the rock excavated by the Royal Engineers during their extensive tunnelling work inside the Rock itself. This

extension still forms the basis of the runway at Gibraltar. At the other extreme of weather, No 5021 Sqn took over from the RE and extended the runways at the two main airfields in Iceland, and here too these extensions are still in active use today, though doubtless resurfaced many times.

Similar stories pertained in Libya, Malta, Persia, Iraq, Aden, North-West Africa, West Africa and Italy, indeed pretty well wherever the RAF went the ACS went too. In the Far East, however, the story was a little different. Most of the construction work for the numerous RAF aerodromes built to support the Malaya campaign were built by local labour under RE control and supervision. In May 1945, however, with the end of the war in Europe it was decided to withdraw two wings from the Continent and send them to the Pacific. It was intended that they would build airfields on the island of Okinawa to support Tiger Force, the force of heavy bombers which it was intended to withdraw from Bomber Command for operations against the mainland of Japan. By the time the wings reached Eastern Waters, however, the attacks at Hiroshima and Nagasaki had resulted in the Japanese collapse. One wing of the Force was, therefore, diverted to Singapore and the second, No 5358 Wg, was sent to Hong Kong which it reached on 4 September 1945. It was immediately given the task of occupying Kowloon on the mainland. Its first task was to take over strategic points on the peninsula and to maintain law and order and in particular to stop the widespread looting. Some 18,000 Japanese troops were rounded up and disarmed. The wing also set about restoring electric power, sewerage and other basic facilities which had broken down or fallen into disrepair as well as bringing Kai Tak airfield, which had been badly damaged, back into use as quickly as possible.

The remarkable variety and geographic spread of the ACS during World War Two belies its relatively modest size, a peak strength of some 30,000 personnel. Post-war, I do not have to tell most of you that the history of the Branch was less happy. The first suggestion for disbandment was made in 1949, and although the ACB survived until the mid-1960s, its existence was often hand to mouth. The eventual transfer of its responsibilities to the Airfield Squadrons of the Royal Engineers brings our story full circle.

## **FEEDBACK**

### **The Educational Background of Battle of Britain Pilots**

In his address to the Society's 2010 AGM (Journal 50) Dr Michael Fopp quoted a figure of barely 200 pilots as having public school backgrounds in Fighter Command at the time of the Battle of Britain. That figure, which has also been used by others, is wrong. An important factor influencing the recruitment of British pilots was their educational background and I would have liked to have included some study of it in my own work (Journal 36) but such information is very difficult to obtain because, with notable exceptions, as in the records of Cranwell, Halton and the University Air Squadrons, it is not generally available in the public domain. However, I can currently attach public school origins to the names of 196 Regulars and 225 Reservists, giving a total of 421 men.

I am certain that more could be found among the present unknowns. For example, there were 152 pre-war Auxiliary Air Force (AAF) officers in the Battle and for 82 of these I have data showing they had attended public schools. That leaves 70, of which 5 attended a non-Headmaster's Conference secondary school, so that there are 65 unaccounted for. Given the social backgrounds from which the pre-war AAF officer pilots were drawn it is unlikely that none of those 65 attended a public school. Similar sorts of argument can be applied – with less force perhaps – to officers on Short Service Commissions, for whom I can identify 109 public schools and also to the very large number of VR pilots of whom I currently know of 143 with public school backgrounds.

No real harm is done by the 200 figure except that it does not acknowledge the contribution which a particular sector of the educational establishment made in providing pilots. The majority of British pilots were not from public schools and that also needs to be widely recognised, as it was by implication in Dr Fopp's address.

**Dr Tony Mansell**

### **Date of the *Luftwaffe* attack on NE England**

On page 177 of the Society's previous publication, the hardback *Bristol Connection*, Air Cdre Graham Pitchfork cited 14 August 1940 as the date of the major raid mounted by *Lufflotte* 5 which was countered by Spitfires. AVM Sandy Hunter has pointed out that the date was actually the 15th and that the raid was actually seen off by at least as many Hurricanes (Nos 79, 605 and 607 Sqns) as Spitfires (Nos 41 and 72 Sqns).

It is quite possible that responsibility for the incorrect date actually lies with the Editor, who may well have mis-heard it when transcribing the audio tape of the discussion into print.

### **Apology to Gp Capt Andrew Thompson**

Wherever the responsibility for the above error may lie, there can be no question that the Editor dropped the ball on page 74 of Journal 50 where Gp Capt Andrew Thomas was cited as the author of 'Arthur Tedder – Air Power Maestro'. That article was actually written by Gp Capt Andrew Thompson MBE BA MA MPhil. Due apology is made for this unfortunate error.

## 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.**

**The Fighting Cocks** by Jimmy Beedle. Pen & Sword; 2011. £25.00.

Jimmy Beedle's chronicle of No 43 Sqn's career has always been one of the better unit histories. His second edition refined some of the original content and extended the story from 1964 to the early 1980s. As a mark of respect, as the now late Jimmy Beedle, he remains the accredited author of the third edition. This 344-page hardback (which is about 50% larger than its predecessor) has actually been compiled by a team lead by Norman Franks and an ex-CO, Wg Cdr Andy Moir, who have confined their efforts to updating the tale. While no attempt has been made to revise Beedle's account of the first seventy-odd years, it has all been reformatted, as indicated by, for instance, the deletion of old-fashioned full stops and the replacement of archaic abbreviations, thus D.F.C. and I.A.S. have become DFC and IAS, and P.O. and F.O. have given way to Plt Off and Fg Off, all of which has improved the overall appearance of the text.

While leaving the original narrative intact, the new brooms have shown no such reticence over extending the photographic coverage and the third edition has (by my count) no fewer than 365 illustrations, compared to a mere 115 in the second – and that does not include an appendix containing seventeen of Duigald Cameron's profiles of representative aircraft flown by No 43 Sqn and half-a-dozen of Chris Golds' paintings of specific incidents. All of these are in colour, as are most of the post-1985 photographs; my only criticism is that some of the latter could have been a bit bigger. Reproduction quality is excellent throughout, as is the overall presentation of the book – this is one of Pen & Sword's better efforts.

All of the usual annexes are provided, updated to the final disbandment in 2009. A lot of work has clearly been done to refine the lists of individual aircraft flown by the squadron, although there are still some gaps to be filled, especially for the types flown prior to 1930 (and a couple of the serials listed as Siskins – J8341 and J8363 – were actually Avro 504s) and, a little surprisingly, the Tornados, for which dates of receipt are noted but only occasionally when they were

disposed of. Errors? Yes, one can always find something: the picture captioned as a Camel on page 21 is actually of a Snipe; the temporary hangar illustrated on page 219 is not really a Bessoneau; and the claim on page 248 that the 168 aircraft that flew over London in 1990 constituted the 'largest flypast ever mounted by the RAF' is a bit extravagant, as 304 aircraft took part in the Victory Flypast in June 1946 (including about 40 from the FAA) and no fewer than 641 flapped, droned and whistled past the Queen at Odiham in July 1953.

All of that aside, how does the book read? Very well. The problem, if that is the right word, with all unit histories is that they do tend to be a bit repetitive and most folk will tend to focus on the period that they recall themselves. They will not be disappointed. This book is well written, short on typos and long on anecdote, especially during the Phantom and Tornado eras. It is nice to know, incidentally, that in 1996 the Canadians were still offering the same advice to any aircrew who were considering fighting off a grizzly bear with a handgun as they had given me thirty years before (see page 271).

If you are into squadron histories, they don't come much better than this. Sadly, the question left hanging in the air at the end of the final chapter is – will there ever be a fourth edition?

**CGJ**

**Lightning Boys** by Richard Pike. Grub Street; 2011. £25.00.

*Lightning Boys*, edited by Richard Pike who is an ex-Lightning pilot himself, is a miscellany of tales in and around the cockpit recounted by ranks from flight lieutenant to air chief marshal. It makes complementary reading to Peter Caygill's *Lightning from the Cockpit* published by Pen and Sword in 2004. The twenty-two stories in this new publication are accompanied by a random selection of colour and black and white images which include the famous photograph of a development batch Lightning plunging vertically into a field with a tractor driver witnessing George Aird, a de Havilland test pilot, separating from his ejection seat. The contents include a comprehensive index, an appendix listing the variants and production numbers of all marks of Lightning and a description of the continuous challenges which faced the engineers in trying to improve reliability and serviceability throughout its service life.

The chapters cover the thirty year career of the Royal Air Force's

first truly supersonic fighter and while the writing styles vary from the strictly factual to the marginally poetic, they make entertaining reading. There are accounts of emergencies in the air, a regular occurrence in the Lightning, from the mysterious and strangely telepathic to the wildly inventive. The latter theme includes an amusing account from the engineering officer that, given the responsibility to transport the P1 prototype from Hendon to Binbrook, he dreamt that he had flown it between the two bases. Perhaps he was prompted by the circumstances of the single unplanned sortie flown by an engineer, but pilot qualified, wing commander in 1965. While performing high powered engine ground runs at Lyneham the Lightning jumped the chocks and flew around Wiltshire for half an hour or so before the ex-Chipmunk rated officer landed it successfully. Sadly, while it does receive a brief mention, the full story of this dramatic escapade does not appear in the book. Also I question the assertion that a Tengah-based Lightning F6 could reach 85,000 ft while attempting to intercept an RB-57F (at over 100,000 ft?) and was there any truth in the rumour that a stolen USAF Hercules was shot down intentionally by a USAF pilot serving on an exchange tour on a Lightning squadron?

Those of us who flew the brute have our own tales of excitement in a machine which handled superbly and had an exhilarating performance but suffered major shortcomings as a front line fighter. It met the narrow requirement to be airborne within two minutes from the order to scramble and to climb rapidly to intercept the Bear but with its short range and inadequate weapons fit it was never a battlewagon in the same league as the Phantom. Despite these operational limitations however, the authors display an understandable thread of loyalty for their steed and while the memories of the writers are recorded, mostly in affectionate terms, there is ample evidence of the Lightning's ability to bite with several stirring accounts of airborne emergencies caused by hydraulic failures, fires, loss of control, ejections and survival at sea. Throughout its life it was a real challenge to its hard working engineers and the tragic and most recent Lightning accident in South Africa in 2009, which led to the death of the pilot, appears to be the result of another hydraulic fire and loss of control, problems which were faced by many Lightning men over the years.



Little is included about the Lightning's lack of operational capability but *Lightning Boys* is an enlightening canter around the crew room. Although it is neither an accurate nor authoritative volume for the serious historian, it does contain some gems and I recommend it as a good read both to aviators in general and to the Lightning fraternity in particular, many of whom may endorse or dispute the content of the book – and of this review.

### **Gp Capt Jock Heron**

**Vulcan's Hammer** by Chris Gibson. Hikoki; 2011. £29.95.

This book's sub-title, *V-Force Projects and Weapons Since 1945*, is so succinct that it rather sells itself short, because the content actually covers a much broader canvas than the V-Force. A good deal of space is devoted to ideas that never came to fruition, including the BLUE MOON project, which explored pilotless options in the style of the US Matador and Snark, and a variety of very high performance manned aircraft, like Avro's 730, the English Electric P.10, the Vickers SP4 and a number of advanced designs from Bristol. A chapter is devoted to British free-fall nuclear weapons and several schemes that would have involved glide-bombs or stand-off weapons, like BLUE BOAR and GREEN CHEESE, which might have had nuclear options.

All of this serves as a background to the story of BLUE STEEL, which, in effect, provides the book's central theme. The trials and tribulations of this weapon, both technical and political, are examined, warts and all, and there were certainly some substantial warts. Gibson is able to see the project in perspective, however and his final judgement is that, 'The fact that it could be launched in mid-air and navigate at high speed to a target is a triumph of British technology that has gone uncelebrated and it is shameful that it is only remembered for its delays and development problems. The engineers and scientists who worked on Blue Steel deserve better.'

That said, I did spot one or two anomalies relating to BLUE STEEL. Training rounds were not painted blue. There was a blue one, probably only one, for early publicity purposes, but during the four years that I flew with the system I never saw one that wasn't white. There is a statement on page 86 to the effect that a BLUE STEEL had to be defuelled after only a week on standby – a tricky business,

involving the handling of very volatile high test peroxide (HTP). Clearance for a fuelled BLUE STEEL to stand QRA was not actually granted until July 1964 but when it was, it was for thirty days and in August 1965 this was extended to forty. I was also surprised to find no reference to Operation FRESNO which involved the launch, from low-level, of four missiles during 1966-67, two from Victors and two from Vulcans, to impact in the Aberporth Range. The most demanding trajectory involved a 67° angle-off launch at a range of 43 miles, resulting in an impact 1,055 yds from the target (which is close enough for a megaton warhead), but the fact that these eight-ton brutes were fired over the UK at all must surely say something about the degree of confidence that had been established by then.

The later chapters of the book go on to discuss Skybolt and the various projects associated with it, including the idea of maintaining an airborne deterrent, to which someone assigned the really annoying term 'poffler'. Victor- and Vulcan-based pofflers were schemed but the best option would have been a VC10 packing as many as eight Skybolts, which, with the occasional top up from a tanker, could have 'poffled' about comfortably for twelve or fourteen hours at a time. Thereafter, the projects become increasingly 'what if' and, while a lot of entirely new ground was being broken in terms of re-entry vehicles and exotic fuels, it is surprising how many of these schemes were fundamentally based on the BLUE STEEL project. By strapping supplementary rockets to it, installing ramjets, stretching the airframe (in various directions), altering the wings, and so on, Avros extrapolated the design for all they were worth to scheme satellite launchers, anti-satellite systems, ship-and ground-based bombardment missiles and even an X-15-style manned research vehicle.

Later chapters revert to more conventional ideas, including the Vulcan's being armed with Shrike and LGBs during the Falklands campaign. The latter were never actually used, but I doubt that it was ever envisaged that this would have involved a 'laser designator being operated by one of the crew in the bomb-aimer's position' – targets would actually have been marked by soldiers on the ground. More exotic (non-Falklands) projects envisaged the Vulcan as, for instance, a 'fighter' fitted with a suitable radar, perhaps an AWG-9, and armed with an arsenal of missiles, like Sea Dart or the AIM-54 Phoenix, mounted under the wings. Other options considered included

suppression of enemy air defences (SEAD) using multiple TV Martels under a Vulcan, and maritime strike with half-a-dozen Sea Eagles tucked into the bomb bays of redundant Nimrod AEW 3 airframes or even A400 transports which could potentially dispense as many as twenty-seven from rotary launchers in the freight bay.

All of this just skims the surface of a book that provides details of scores of fascinating ideas and design concepts, most of which came to nought, vividly illustrating Gibson's point that 'for every piece of hardware that enters service, a thousand paper studies were conducted.' And 'illustrating' is the operative word, as the book is packed with pictures of hardware and mock-ups, artists impressions of selected projects that never made it and well over a hundred scale general arrangement drawings (all rendered by the author) of weapons and missiles and at least another fifty of aeroplanes. Many of these aircraft are actual types, mostly Vulcans, armed with a variety of potential weapons, the rest are of projected aeroplanes that never materialised. The whole 192-page A4 casebound package is very well presented. There is an index and the text, which contains a great deal of information that was new to this reviewer, is well-written. The story that the book tells is, inevitably, more about what might have been than what actually was, but it is never less than interesting.

Recommended.

**CGJ**

**Be Bold** by Air Chief Marshal Sir Frederick Rosier with David Rosier. Grub Street; 2011. £20.

As he approached the end of his long and distinguished service in the RAF Sir Frederick Rosier was persuaded by his son David to write his autobiography. An inveterate letter writer to his wife, he has developed his account built around extracts from these letters. Before his death, he had covered the period of his life to the end of the war and the years that followed have been completed by his wife and his son.

Sir Fred was a fighter pilot throughout his RAF career having started as the junior pilot on his first squadron, subsequently filling virtually every other appointment open to a fighter man, culminating in his appointment as the Commander-in-Chief of Fighter Command.

Joining the RAF in 1935 on a short service commission, he was

posted to No 43 Sqn, the Fighting Cocks, at Tangmere and, after cutting his teeth on the elegant biplane Fury, was one of the first to convert to the Hurricane when it entered service. His time in France in the spring of 1940 was cut short when he was shot down and burned after an engagement with an enemy fighter. After recovering, he fought in the final phase of the Battle of Britain as the CO of 229 Squadron before heading for the Middle East.

His potential as a leader was soon apparent and he played a significant part in operations with the Desert Air Force as a Squadron, Wing and, finally, Group Commander. He formed a formidable partnership with his friend 'Bing' Cross, both leading from the front as they developed successful tactics and operations. The citation for his DSO described him as 'an outstanding fighter pilot and leader'. He went on to play a major role planning operations over NW Europe with the 2nd TAF before becoming a Group Commander.

Sir Fred's post war career included command of a fighter station, an exchange tour with the USAF developing fighter tactics and a stint commanding the Central Fighter Establishment. Service in Aden as SASO was followed by his appointment as CinC Fighter Command before spending three years as Deputy CinC AFCENT until his retirement in June 1973.

Using his letters as the framework for the story has advantages and a few disadvantages. The book, a 256-page hardback with some 70 black and white photographs, is essentially a personal story, which illustrates graphically Sir Fred's humanity, generosity and attractive personality. The chapters on the desert war, its operations, direction and control provide fascinating detail and Sir Fred provides the reader with some interesting insights into the personalities of the main players. He treats the campaign in NW Europe in a similar fashion but the reader is left feeling that the book would have benefitted from a little more detail on the wider operational scene in which he made such a major contribution.

The latter part of the book tends to be a catalogue of appointments and activities and is short on the personal views of Sir Fred and the details and significance of the events in which he played such a key role. However, this section is necessary to complete the story and it highlights the scale of the achievements of a young man who joined for a five-year stint but rose to the highest positions in the RAF.

Inevitably there are a few errors that could perhaps have been avoided. No 501 Sqn was the County of Gloucester, not City of Bristol, Squadron. Willie Tait led the raid that sank the *Tirpitz*, not the *Scharnhorst* and it was somewhat later than 9 June 1944 before the first landing ground in Normandy was brought into operational use.

Despite these minor anomalies, this book is a most enjoyable read, with some fascinating insights into Sir Fred's distinguished career. In particular, the reader is left with a deep admiration for an outstanding officer and his great professional gifts, who never allowed his position to affect his warm and endearing personality and his sense of fun.

### **Air Cdre Graham Pitchfork**

**Sweating The Metal** by Flight Lieutenant Alex 'Frenchie' Duncan DFC. Hodder & Stoughton; 2011. £16.99.

Shortly before leaving the RAF College at Cranwell some fifty years ago, a friend offered the opinion that helicopters were the future and he wanted to fly these, not fast jets. This heresy earned him an interview with the Commandant – at which he was neither invited to sit down nor offered coffee! His career horizons suitably readjusted, he went on his way but a few years later he was able to realise his ambition – and see his prophesy come to pass.

From search and rescue in the Western Approaches to support operations in Afghanistan, helicopters and their crews are certainly grabbing the headlines, and talking with young people who are hoping to embark on a flying career in the RAF, I find that many of them aim to join the rotary winged fraternity.

*Sweating The Metal*, an autobiographical account of support helicopter operations in Afghanistan, complements Roger Annett's *Lifeline In Helmand* which I reviewed in Journal 50. Written by Alex 'Frenchie' Duncan, who, having been brought up in France, studied at university in the UK and, with dual Anglo-French nationality, joined the RAF to graduate as a Chinook pilot.

The 316-page hardback opens with a short summary of the action which was to lead to Duncan being awarded the DFC but then becomes a more traditionally constructed biography. He describes his first encounter with the Squirrel at the Defence Helicopter Flying School and the various travails in learning to fly a helicopter. As one instructor described to me – 'It's like patting the top of your head with

one hand, whilst make circular motions around your belly with the other’.

We follow him as he progresses to the Griffin, with its two engines and greater sophistication, and thence to the Chinook – that enormous workhorse of a helicopter (whoever first gave it the designation CH-47 must have recognised the significance of the number, given that it is the C-47 Dakota of the rotary winged world). As with most members of the Chinook force, Duncan was soon deployed on operations and he shares with the reader his experiences during several detachments. He describes the upheavals which go on and the concerns for his young family, as well as describing the daily grind which characterises operations – periods of calm punctuated by episodes of frenetic activity, coupled with the continuous uncertainty as to what will happen next. He describes, in detail, the events which led to his being awarded the DFC and his subsequent career.

This book, with its eighteen pages of colour photographs, is not a cerebral analysis of the conflict in Afghanistan, simply one man’s involvement in it. There is the *de rigueur* dig at those not generally exposed to the dangers of flying in the face of the enemy but it is a readable account for those who want an insight into the way in which current helicopter operations are conducted.

Oh, and the title? It derives from a description of the way in which the airframe flexes when carrying a heavy load.

**Wg Cdr Colin Cummings**

**Storm Front** by Rowland White. Bantam; 2011. £18.99.

Almost forty years have elapsed since the battle for Mirbat, an isolated Omani settlement on the Indian Ocean, some 40 miles east of the small RAF station at Salalah. In July 1972 some 400 well-armed dissident tribesmen attacked the small garrison around the fort which was defended by a British Army Training Team supported by a handful of native Omani soldiers. Rowland White, author of *Vulcan 607* and *Phoenix Squadron*, has written a detailed account of this action in his new book *Storm Front*. He describes the classified activities of RAF loan service pilots in Oman and their civilian counterparts who, for several years, flew counter insurgency operations in support of the SAS. The action at Mirbat was the largest, and probably the last, major operation involving the extensive

intrusion by rebel forces, mainly Marxist guerrillas, into the western province of Dhofar which bordered South Yemen.

During most of the last century, this remote British presence on the Arabian Peninsula was sustained by a defence and security treaty between the British and Omani governments which, in many ways, was an embarrassment to London. Officially the British presence was solely in a training and advisory role and, because of political sensitivity in the intervening years, very little has been published of the significant events which helped to stabilise the region following the bloodless coup in 1970. This saw Sultan Qaboos assume power forcibly but bloodlessly, having usurped his father Said bin Taimur, with the principal aim of modernising the feudal kingdom.

The author's painstaking research, involving extensive interviews with many of the participants, begins by reviewing the historical context of British activities in the Radfan in 1964 where RAF Hunters and helicopters based at Khormaksar were vital in support of SAS operations in the northern protectorate. He describes the complicated political situation following Britain's withdrawal from the southern Arabian Peninsula and the resulting power vacuum which prompted the rebels to become more belligerent and to seek military training and logistic support from China and Russia.

The account of events, together with the subtle, and some not so subtle, exchanges between Whitehall and those in positions of responsibility in the Oman make fascinating reading. The political reluctance to authorise British personnel to become involved was overtaken by the desperate military situation which emerged when the rebels launched their frontal assault on Mirbat at first light on 19 July 1972. The fort was protected by Omani soldiers and the British Army Training Team, which in reality was a small SAS unit of nine men, and the actions are captured vividly by the author's descriptive writing style, garnished by some imagination and artistic licence. The hard pressed garrison whose only heavy weapon was a single 25 pounder artillery piece, manned solely by a brave Fijian SAS corporal, needed offensive air support urgently but the very poor weather prevented any flying by the small Strikemaster squadron based at Salalah. With the ground situation deteriorating markedly the morning's very low cloud base rose gradually to above 200 feet and the first pair of aircraft were tasked to provide additional firepower to the prolonged and fierce fire

fight around the fort. Small arms fire inflicted some damage to the jets but those which were unscathed returned to attack the advancing rebels using rockets and guns, followed by their helicopter counterparts to deliver reinforcements and to help with the evacuation of casualties. It was indeed 'a close run thing' and the action is portrayed very realistically by the author.

Numerous photographs, few of which have been seen before, together with several helpful maps, add to the attraction of this 364-page hardback making *Storm Front* another excellent account by an author whose work is recognised increasingly as very readable military history. There are a few minor inaccuracies where the RAF's Wessex is described as an HC1, Sir Erik Bennett is given the rank of Air Chief Marshal and the fibula bone in the leg is described as a fibia, but these observations are trivial and I commend *Storm Front*, both for inclusion in the personal library of those who served around the Arabian peninsula, but also as an informative and entertaining read for all those with an interest in the political history of, and military action in, the Middle East.

### **Gp Capt Jock Heron**

**Racing Ace** by Julian Lewis. Pen & Sword, 2011. £25.00.

The author set out to write a biography but, rather than 'the life of' his subject, he was obliged to settle for '*The fights and flights of Samuel 'Kink' Kinkead DSO DSC\* DFC\**', which is the sub-title of the resultant 270-page hardback. The reason is that, while Kinkead was a very successful aviator and, latterly, even a 'celebrity', he left very few substantial traces in the wake of his remarkable career. There is a photograph album and some press cuttings, but no personal correspondence, no diaries and no log book so, since all of his contemporaries are deceased, Lewis ponders whether there is even much point in attempting to tell his tale at all. He concludes that it is, on the grounds that some of the events in which Kinkead was involved are relatively well documented, so something of his presence can be inferred by revisiting these, this impression being reinforced when there are specific references to him.

In short Kinkead, born in South Africa in 1897, made his way to England to join the RNAS in 1915. Trained as a pilot, he spent 1916 in the Aegean theatre, operating over Bulgarian-occupied Macedonia,



and much of 1917 instructing at Cranwell before joining No 1(N) Sqn (later No 201 Sqn) in France in September. There he matured as a fighter pilot flying Triplanes and then Camels for almost a year during which he was credited with more than thirty victories. After another spell as an instructor he was posted to No 47 Sqn in mid-1919, shortly before it lost its RAF identity, although it continued to fight in support of the White Russians as a volunteer unit until it was evacuated in the spring of 1920. After another year at Cranwell he had a tour with No 30 Sqn (DH 9As) in Iraq and then spent eighteen months with the HQ in Cairo during which he commanded the ground party that established the landing grounds in the Egypt-Sudan sector of the route followed by Pulford's Cape Flight in 1926. Having become a QFI in the meantime, Kinkead joined the High Speed Flight in time to compete in the 1927 Schneider Trophy Race in Venice. His Gloster IV developed a technical fault which obliged him to withdraw and, back at Calshot in 1928, he was killed when his Supermarine S.5 crashed during an attempt on the World's Speed Record.

Just thirty-one years of age when he died, an A1 QFI and an experienced and demonstrably successful pilot of fighters, bombers and high speed racing seaplanes, decorated five times for active service and a shoo-in for an AFC if he had taken the record, which was well within the S.5's capability, Kinkead was clearly a star performer. Had he lived he would almost certainly have achieved air rank. But it was not to be and, despite his prominence, and the public acclaim that came from being associated with the High Speed Flight, Kinkead the man, remains an elusive figure. He is not quite a cipher; contemporary observers all seem to agree that he was a much admired and respected individual, but there is a lack of substance and (for me) the structure of the book doesn't really manage to fill in the blanks.

There are occasional insights into his capabilities, in the Combat Reports he submitted in France, for instance, but there are lengthy gaps in the record. His seven-month stints at Cranwell in 1917 and at Leuchars in 1919 are both afforded less than a paragraph and his three months with No 5 FTS gets just one line. The more exciting episodes are given a lot more space but there is an impression of padding, as ten or twelve pages often drift past without any specific mention of 'Kink'. For instance, while twenty-two pages are devoted to an account of the Cape Flight, Kinkead's contribution was in a

supporting role and references to him are sparse and marginal. Again, we are provided with quite a lot of information on the Gallipoli campaign, although this was practically over before Kinkead had even reached the Aegean and there appear to be only two contemporary references to him in-theatre thereafter. Naturally enough, a great deal of space (roughly 40% of the entire book) has been devoted to his time with the High Speed Flight and the circumstances surrounding his death. The RAF Court of Inquiry found that the aircraft had stalled but failed to determine why. Was it simply pilot error, or was there a structural fault, as some witnesses maintained? Lewis rakes over the evidence but, unsurprisingly, fails to provide a definitive answer to the question.

So – to buy, or not to buy? That is the question. If you want an accessible and readable account of some (by now) fairly obscure events, the Cape Flight, the intervention in South Russia, operations over Kurdistan in the early 1920s and so on, these are all dealt with quite competently. On the other hand, if you specifically want to know more about Kinkead, you will probably be disappointed – but, that said, this is the only game in town.

**CGJ**

**Hurricanes to Murmansk.** Atoll Productions; 2011. £9.99.

In 2006, our Society helped fund the making of a film about an Anglo-Soviet air operation following the German invasion of Russia in June 1941. At Stalin's request, in August that year Churchill sent two squadrons of Hurricanes, thus forming 151 Wing, on the first Arctic convoy to Russia. The aim of the detachment was to protect the strategic port of Murmansk, which became a vital entry point for supplies being sent to the Soviet Union for the remainder of WW II.

Encouraged by our own Air Cdre Phil Wilkinson, an ex-Air Attaché in Moscow, Roy Perkins of Kingston University and Atoll Productions made a 28-minute DVD weaving together archive film with some fine modern footage of the Hurricane. To this has been added film of surviving veterans, telling their previously untold and unrecorded story, and of a reunion in Murmansk in 2005, when their efforts seem finally to have been appreciated. The historians Antony Beevor and Richard Overy are seen putting the events into context.

Our editor reviewed the original DVD in Journal 38. Now, Atoll

Productions have revised and expanded the film, (releasing it, as a Blue Ray DVD, to mark the 70th anniversary of Hitler's invasion of Russia) and have added extra features including photography of recent displays at Brooklands featuring the Battle of Britain Memorial Flight. The DVD now runs to 63 minutes. It begins and concludes with the 2009 auction at Sothebys of the medals of Wg Cdr Ramsbottom-Isherwood, the charismatic New Zealander CO of 151 Wing. In addition to a DFC and AFC, he was awarded the Order of Lenin by Stalin – one of only four such medals given to British airmen in WW II. That nearly unique decoration raised the bidding – shown on the DVD – to £40,000.

Some three thousand Hurricanes were eventually supplied to the Soviet Union and 151 Wing led the way. The story has been quietly forgotten since the end of WW II – perhaps because of the Cold War – and its recent emergence on this film does credit to all involved.

**AVM Nigel Baldwin**

## **ROYAL AIR FORCE HISTORICAL SOCIETY**

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

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

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

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

### THE TWO AIR FORCES AWARD

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

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

### THE AIR LEAGUE GOLD MEDAL

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

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

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