

EDITORIAL

Welcome to 2021! With COVID vaccine distribution well under way we can hope for more freedom in due course. We have heard that just one of our members has become infected (so far) but thankfully he is recovering well. The lesson to us all is that he had never left his house for months and had only been visited by checked relatives; so how did he catch the virus? Incoming post, supplies and parcels? Don't take any chances; use an anti-viral spray and wash your hands after handling.

I apologise for so many errors in the subscription non-payers identified in NL 58. This arose through communication lapses in the new bank transfer process.

There have been two Zoom meetings which went pretty well but, in spite of Richard Cannon's notices, attendance was disappointing at less than 40 for both. Let me know what your problems are.

With this Newsletter is your renewal form for 2021-2022 and the notice for the AGM which will be held via Zoom on April 14th. The link will be sent by e-mail.

Send Newsletter contributions to the Editor, Chris Farara at cjfarara@ntlworld.com or by post to 24 Guildown Road, Guildford, Surrey, GU2 4EN. Phone 01483 825955

PROGRAMME FOR 2021

Due to the Coronavirus pandemic all events have been postponed until further notice. The situation is, however, being kept under review by the Committee. Meanwhile the intention is to continue to hold Zoom meetings. Richard Cannon will keep Members informed by e-mails and provide links. If you know a Member without e-mail, please pass on Richard's message by telephone.

AIRCRAFT NEWS

Harriers for sale by Everett Aero are: GR9 ZG478, the much publicised Kandahar crash aircraft, being restored for static display; an unidentified Harrier II airframe (looks like a GR5/7); T4 XW267, a possible return-to-flight project; and FA2 ZH806, "complete and ready to fly." On e-bay an FA2 is open for bids in Alberta, Canada. At JetArt the Astra Hawk XX341 and VAAC Harrier are still available, as is Global Planes' Abu Dhabi Hawk Mk63 in Turkey. Airworthy Gnat TMk1 XR984/N316RF is still available in Illinois. Hunter Mk58, Miss Demeanour has been sold and Thunder City in Cape Town has airworthy Hunter TMk8A, XF967/ZU-CTN for sale. Also still for sale are Art Nalls's Harriers. In Australia two Sea Furies are being restored, an Iraqi Fury, VH-SHF and FB11, WG630. Centaurus powered FB11 G-CBEL/N365F has been sold after a long restoration.

If you would like to fly in a Hunter, MiGFlug in Switzerland will sell you 25 minutes over the Alps for 7500 Euros in their ex Swiss Air Force TMk68, J-4201.

HURRICANE LANDING ACCIDENT AT DUXFORD

The undercarriage of Hurricane Mk1 V7497/G-HRLI collapsed during a cross-wind landing at Duxford on June 1st 2020. There was minor damage to the underside and the propeller was bent. Repair is under way. The unidentified pilot was blamed for failing to properly control the aircraft.

P.1127, KESTREL & HARRIER SURVIVORS ON DISPLAY - WORLDWIDE

A survey of the internet revealed the following:

P.1127	3	All in UK
Kestrel	5	1 in UK, 4 in USA
Harrier GR1/3	19	13 in UK, 1 in each of NZ, USA, China, Belize, Chile and Poland
Harrier T2/4/50*	4	All in UK
Harrier GR5/7/9	7	6 in UK, 1 in USA
Harrier AV-8A/C/S	16	14 in USA, 1 in UK, 1 in Thailand
Harrier TAV-8A	2	Both in USA
Sea Harrier FRS1	1	In UK
Sea Harrier FA2*	7	All in UK
Sea Harrier FRS51	1	In India
Total	66	

* Art Nalls's FA2 and T8 are currently up for sale in the USA so are not on display.

THE FALL OF ICARUS - RAF POLICY IN FIGHTER DESIGN 1945 - 1949

Due to the Coronavirus pandemic the Association has not been able to hold its usual Wednesday afternoon meetings at the YMCA Hawker Centre in Kingston but as members have become familiar with the internet Zoom facility the Committee and Chairman decided to see if Members would like to see talks on this medium. The Rev Dave Priddy already used Zoom for his church so he offered to host our first experiment, a talk by HA Member Dr Michael Pryce, which was Zoomcast on December 9th.

After gaining a BA in history at Manchester University Mike was awarded an MSc and Diploma at Imperial College London in the history of technology, followed by a DPhil in science and technology policy at Sussex University. At Manchester Business School he became a research fellow and at Cranfield University he was a lecturer at the Defence Academy at Shrivenham, became accredited as an Independent Scientific and Technical Advisor to the MoD and was a Senior Air Systems Analyst at the MoD Defence Science & Technology Laboratory (DSTL). He has also advised BAE Systems on project design matters and is about to start working for the company.

Designing, building and operating aircraft is not a pure science and can be accomplished in various ways. The practical way things were done at Kingston went against the scientific methods adopted elsewhere.

Post WW 2 the UK looked at the application of science to aircraft design. The origin of the different approaches at Kingston and Warton was in the 1940s, not in culture but in what they were doing and why.

The VE Day flypast in 1946 illustrated the fact that the war was won overwhelmingly by piston engined aircraft and in 1945 the RAF had as many Gladiator biplanes in service as jet propelled Meteors. Few new wartime ideas were developed or applied during the war; radar, the jet engine etc were pre-war developments. WW 2 was a war of production, not innovation. That wars are not won solely by fighting but also by production was recognised by all combatants. During the war there was incremental improvement of existing aircraft with increased mass production. So, applied science was a novelty and the RAE was mainly concerned with improving existing aircraft in small steps in close relationship with the RAF. Doing the radically new things, like the Miles M.52, were side issues.

Post war there were new technologies - the jet engine, use of radar inside the aircraft. There were huge existing air fleets which had cost a lot of money. There was no threat of attack on the horizon so what should the Government do? Rely on the piston engined aircraft or embrace the new technologies? It was decided to go for the new and throw away many of the existing types, even in those times of great austerity; to maintain the production capacity for a possible war and to innovate by design.

Official RAE missions to Germany had been shocked by the new technologies of swept wings and jet or rocket propelled fighters. Examples were brought to Farnborough and exhibited. The new technologies were clear and the policy was adopted by Britain. The RAE saw they could take a leading role in designing aircraft, taking it away from industry which would productionise the designs. Sir Stafford Cripps wanted to nationalise as well, but it did not happen.

The biggest new threat at the time was the atomic bomb where one aircraft and one bomb could do what had needed thousands of bombers using conventional bombs, as demonstrated by the destruction of Hiroshima. Only the USA and the UK had nuclear weapon technology but Russia knew what was going on through espionage. Other countries could develop atomic weapons against which Britain needed a defence; they needed to shoot down almost all atom bombers.

In WW 2 to shoot down 10% of raiding bombers was an amazing result and 3 - 4% was considered quite good. Against atom bombers it would be necessary to down 90% (not of 1000 but of 10, 20 or 30, say) to avoid mass destruction. This was the problem the RAE focused on. To achieve a 90% bomber kill rate needed high altitude interception using integrated radar and weapons. The solution needed the application of science which industry could not do; a scientific institution was needed to pull all the technologies together, like the RAE.

The RAE was not alone in this view. Air Chief Marshal Sir James Robb, Commander in Chief Fighter Command, published a paper addressing the interception problem and 90% success rate. He foresaw new technologies including airborne control units (AWACS today) over Europe, far enough from the UK to identify the raiders early; UK ground based radars would be too late. He saw the need for UK based supersonic fighters and stowed parasite fighter carriers loitering far away to ensure early interception, and for weapons powerful enough to guarantee instant destruction of the bombers, possibly long range, radar guided missiles with proximity fuses. Even the installation of 4.5 inch guns in fighters was considered; one hit would bring down a bomber.

In Germany the RAE mission also spoke to people and spotted Hans Multhopp, a maths prodigy and student of the aerodynamicist and mathematician, Ludwig Prandtl at, Göttingen University. Multhopp worked under Kurt Tank at Focke-Wulf where he conceived the 1944 Ta183 with 42 deg swept blunt leading edge wing, tall, highly swept fin carrying a highly swept tailplane on its tip. The short fuselage housed a jet engine fed by a nose intake. It was an 'emergency fighter' to defend the Reich from expected B-29 Superfortress raids by flying high, diving fast through the Mustang escort fighters to hit the bombers and fly clear. It proved difficult to make the design work aerodynamically and, especially, structurally. However, this aircraft looked like what the UK needed to leapfrog to a new level, so Multhopp, with his assistant Martin Winter, was brought to RAE in 1946. Multhopp, from an apparently ultra right pro-Nazi family and seemingly unperturbed to see thousands of Poles and Hungarians as slave labour, was difficult to work with.

The highly swept wing had quite a large leading edge radius which created a high leading edge suction to offset the induced drag. The 'T' tail was clear of fuselage and wing turbulence to reduce drag. Multhopp hated delta wings and won over the RAE who set up an advanced study fighter group which produced a document describing a configuration very similar to the Ta183. This was distributed to many UK fighter companies who were invited to make proposals based on this configuration. Hawker's was the original P.1067 with nose intake and 'T' tail, and English Electric's was what became the Lightning. Armstrong Whitworth and Fairey also submitted designs. Multhopp had convinced the RAE that 'T' tails were best and later many UK aircraft used them; eg Buccaneer, Javelin and many airliners.

The RAE commissioned Shorts to build a low speed wooden aircraft with adjustable wing sweep and tailplane position, and English Electric to build a high speed test vehicle. At EE Freddie Page cut the wing tips to give aileron hinge lines at right angles to the fuselage and moved the tailplane to a very low position. Kingston also lowered the tailplane, reduced the wing sweep, and replaced the nose intake with two side mounted wing root intakes for many sensible reasons.

Highly swept structures are very difficult to design and are heavy. At Warton EE had to work very hard to do the structural analysis and settled on the 'relaxation' technique developed at Oxford in 1938. However, the mathematics was very laborious and needed to be speeded up; but how? A 1930s paper by Alan Turing led to the first digital computer, 'Pilot Ace', at the NPL in Teddington., and the 'relaxation' method was something he wanted to tackle. EE's Ivan Yates and others used 'Pilot Ace' to solve their wing maths and flutter problems. It took two years.

Meanwhile Hawker had flown the Hunter. Ralph Hooper, then in the Experimental DO, had designed and stressed the wing root spar fixture in a couple of weeks. Hawker got some 2,000 Hunters, with four 30 mm cannon to destroy bombers. into service before the RAF had their first Lightning.

The nuclear bomber threat which the Lightning was designed to counter had meanwhile largely gone away and Duncan Sandys' 1957 White Paper deemed it would be Britain's last manned fighter. The Hunter proved to be very adaptable to new roles because underwing store carriage was easy, and also easily modifiable because of its simple structure where possible failure could be predicted. The Hunter was a flexible, simple design lending itself to incremental improvement and requiring no new science or design tools. The Hunter demonstrates that you don't have to go to the most sophisticated technologies; there are simpler ways. Good design tends towards simplicity rather than creating something complex and having to invent new solutions.

The Lightning was twice as fast as the Hunter, cost four times as much and was used for half the time. The Hunter generated more income for the UK than did the Lightning.

Fighter procurement has moved away from the WW 2 concept of improvement and mass production to 'silver bullet' projects incorporating enormous technologies, purchased in small numbers and costing a fortune. The tendency is to go for new advanced technologies rather doing what is possible today. Government policy says science is the answer so if we throw more money into science and innovation then things will be better. Perhaps we should focus on what can be produced today because the future will be different to what is imagined.

Multhopp's thinking was imbued into Warton leading to aerodynamics-led science, believing in new techniques and technologies rather than making use of what is available today. Kingston took the simple, intuitive physics approach rather than complex mathematical analysis.

Post war UK policy was to try to fly too high, too close to the sun like Icarus. This was too hard and too time consuming. If the UK had done more Hunter type projects and fewer of the Lightning type which litter the 'project cancelled' genre of books which chronicle the leapfrogs that never happened, we might have had a very different aircraft industry today.

After a short Q & A session, interrupted by internet problems, Frank Rainsborough (our recently appointed Speakers Secretary) gave the vote of thanks to Mike Pryce for his engrossing talk, thanked Dave Priddy for hosting the Zoom meeting which had been largely successful, and Chris Roberts for proposing it. There were 38 participants.

THE GREAT TRANS-ATLANTIC AIR RACE 1919 - PART 1

David Hassard gave the Association's second Zoom talk on January 13th 2021. It worked very well with some 40 participants. The speaker, well known to the Association, was introduced by Chairman Chris Roberts who also thanked Dave Priddy for arranging the Zoom session. *Members can see the illustrated talk on YouTube via a direct link from David Hassard - e-mail him at dh20tg@gmail.com. The following account was slightly adapted from David's script for the whole talk and will be published in several part. Here is the first.*

In strict chronological order, David's talk followed the challenges, frustrations, dramas and achievements of all the contenders in the race to be first to fly across the Atlantic in response to Lord Northcliffe's Daily Mail £10,000 prize challenge - about half a million in today's money. This was an extreme challenge since virtually nothing was known about weather conditions high above the notoriously stormy North Atlantic. Even the shortest route, from St John's, Newfoundland, to Ireland, is almost 1,900 miles.

The highly-competitive Sopwith team was quick to respond and in just six weeks built a fuselage similar to their B1 and Cuckoo bombers but sturdier and deeper to accommodate the much more powerful 300+ horsepower Rolls-Royce Eagle V12 engine in front of a huge 330 gallon fuel tank and 24 gallon oil tank ahead of an open cockpit for the

crew of two. A gap in the top decking between the cockpit and the tail fin accommodated an inverted lifeboat. Test pilot Harry Hawker also insisted on a jettisonable undercarriage to save weight and drag and reduce fuel usage, the fuselage underside being reinforced with wooden skids for landing on grass. Built in Sopwith's factory in Kingston upon Thames, by 10th of February 1919 the Sopwith Atlantic was on engine tests at Brooklands aerodrome. The aircraft had fat tyres for rough field operations and a small retractable windmill driven electrical generator on the side of the fuselage for the experimental Marconi radio and radio direction finder. Test flights started on 21st of February, working up to a long practice flight.

Meanwhile in America, Swedish pioneer aviator Hugo Sundstedt had this 'Sunrise' twin Liberty engined floatplane built but after just one mile on its first flight it suffered an engine failure. The US Navy was determined to be first to fly the Atlantic. However, the first of their huge US Navy designed and Curtiss built NC flying boats failed to take off with the required fuel load and they needed to fit a fourth engine, like the other three NCs under construction.

By early March Harry Hawker and his navigator, Kenneth Mackenzie-Grieve, had completed a 900 mile 9 hour endurance test flight and on the 18th of March left Liverpool for Newfoundland on the SS Digby with the aircraft and a small team including a Rolls-Royce engine mechanic.

Sopwith's Brooklands rivals, Martinsyde, had built the Raymor, named after pilot Fred Raynham and navigator Fax Morgan. It was similar to the Sopwith Atlantic but without the jettisonable undercarriage and lifeboat. Formal entries for the race so far included Whitehead Aircraft of Richmond on Thames, the Aero Club of America with an Italian Caproni flying boat and Handley Page with a four engined V/1500 bomber, whilst more secretly also preparing machines were Fairey Aviation, Short Brothers and Vickers. On 27th of March, after a successful 10 hour non-stop flight back and forth between Brooklands and Southampton, the Martinsyde Raymor was tied down in a hangar with the crew aboard for a 24-hour simulated Atlantic flight, after which the engine was found to be in excellent condition.

The next day the Sopwith team arrived off Newfoundland to find that St. John's Harbour was still ice-bound so they had to go round to Placentia Bay where the two large crates and many other smaller crates had to be trans-shipped to a smaller steamer capable of getting into Placentia harbour, and then onto railway wagons at the quayside for an uncomfortable 60 mile narrow gauge train journey to St. Johns. All this took two extra days so Harry's plan to build and test the machine in two weeks, then making the Atlantic flight around full moon in mid April, was already looking very optimistic. Despite being on the same latitude as northern France, Newfoundland is sub-Arctic, not warmed by the Gulf Stream, so there was still snow on the ground, and the terrain was much more rugged than Harry had expected. From the station the crated aircraft, mounted on timber platforms, was slowly drawn 4 miles uphill by five pairs of horses through deep mud and slush to the team's chosen field at Mount Pearl. Harry's concerns increased when he saw this best available field. The ground was sodden with melting snow and 60 local labourers were already employed attempting to fill the worst soft patches. The field was L-shaped around a steep-sided hill, the east-west leg being just 400 yards long and the sloping, north-south leg only 200 yards.

On the 2nd of April the Handley Page V/1500, modified with an extra 2,000 gallon fuel tank and floatation bags in the fuselage, started extensive flight trials at Cricklewood, north London. On the 3rd April Sunstedt's American built floatplane is tested by a Russian pilot but stalls, spins into the sea and is wrecked.

It took a week to assemble the Atlantic in the substantial wooden hangar prepared for the Sopwith team whilst snow and rainstorms continued outside. One morning, with the mud-bath airfield hardened by frost, Harry managed a successful, lightly loaded 70 minute flight despite damaging the rudder on take-off, but sank into the softening ground on landing.

Unknown to the Sopwith team, rivals Short Brothers, were close to stealing a march on them. The Short Shamrock made its first flight on the 8th of April and was nearly ready for an east-west flight from Ireland. A development of the Short Shirl torpedo bomber with its range dramatically extended by a 435 gallon external fuel tank suspended in place of the torpedo. Other competition is also catching up. Three days later Fred Raynham and the Martinsyde team arrived in Newfoundland and secured the use of a narrow strip of land alongside a lake at Quidi Vidi, just outside St John's. On 13th of April a Vickers Vimy bomber with two Rolls-Royce engines made a first test flight at Brooklands. Just demobbed from the Royal Naval Air Service, Cpt Jack Alcock had personally convinced the sceptical Vickers management that they should compete. They were impressed by his experience flying a Handley Page bomber over the Aegean and by the thought he had given to making a successful Trans-Atlantic flight whilst a prisoner of war in Turkey. He had personally been overseeing the building of this, the 13th Vickers Vimy.

Waiting for better conditions, Hawker and Mackenzie Grieve tested their ditching survival kit by removing the three ply lifeboat from the aircraft and taking it to a lake. The bow contained a sea anchor, emergency rations, paddles and smoke flares plus parachute flares for night signalling. Inflated, the stern floatation bag also supported the collapsible canvas top decking. In their American Navy pattern immersion suits they replaced the very heavy Kapok insulation with air bags which could be inflated if needed by mouth.

On 16th of April, in a lull in the storms, the Martinsyde Raymor was dragged across the road from its tent hangar to their narrow airstrip on the water's edge at Quidi Vidi. Witnessed by a large crowd the lightly loaded machine made a 3-hour test flight and a perfect landing. Both the Martinsyde and Sopwith teams were staying at the Cochrane House Hotel watching each other in a cat and mouse game. The following day Raynham made another short trial flight whilst the Sopwith Atlantic was loaded with its 350 gallons of fuel, and oil, ready to get away, as always planned,

around 4 p.m. local time. It would then be navigated by the stars through the night and reach Brooklands at 4 p.m. the next day. However, weather conditions deteriorated and another day was lost.

Meanwhile, at Eastchurch, the Short Shamrock took off to fly to Ireland in preparation for its non-stop east-west flight across the Atlantic. Flying direct over England and North Wales, it was 12 miles out to sea off Anglesey when the engine stopped and could not be restarted. Gliding back towards land it ditched a mile off-shore. The crew was rescued and the aircraft floated but was seriously damaged by 22 hours in the sea. The problem was found to be an airlock in the fuel transfer system. Next to be tested was the Rolls-Royce Eagle-engined, Fairy Threelantic, developed from the Fairey 3C. It was the only remaining floatplane entry and had the luxury of covered cockpits.

On 20th of April, and then again on the 22nd, both teams at St John's readied their aircraft until forecast storms in mid-Atlantic aborted their departures. During April there had been two days completely fogbound, many days with gales, 17 of them with rain and 5 with snow. The airfields were still very muddy. At long last old friends and rivals, Harry Hawker and Fred Raynham, shook hands after agreeing to give each other two hours notice of their intention to leave to avoid the unnecessary risks of a rushed departure. Although the best time in May should have been the 12th or the 19th, with a full moon to aid visibility and navigation through the night, both teams would now prepare their aircraft each day for an earlier weather window, whilst their navigators honed their wireless skills. It was not just about weather conditions for the take off; from a patchy pattern of ship's sea level weather reports, they could only best-guess the likely weather conditions high above the Atlantic.

To be continued.

A HAWKER TRADE APPRENTICE IN THE 1950s

Terry Howes remembers his start at Hawker....

In late 1952 I left Sir Walter St John's Grammar School in Battersea with a mere four GCEs. The school is now named Thomas's and is the primary school for our young prince and princess. Since I then had to earn a living I started going for job interviews, the first one of which was with an ornamental cement manufacturer called Cementone where I thought I could put my chemistry GCE to good use. The factory was located in Wandsworth which was quite close to my home in Clapham Junction, but after the interview I did not fancy devoting my life to cement, even the pretty coloured variety. Since it was only seven years after the end of the second world war (for everlasting peace), living in London I had a usual childhood interest in military aircraft, mainly fighters. The only aircraft I got close to during the war years in my part of London was, I believe, the fuselage of a crashed Heinkel 111 on the side of a road near my house on my walk to my first school. So when I saw an advert for apprentices at Hawker Aircraft at Kingston, I applied. I may well have been influenced by my elder cousin (Len Burgess) who was an engineering apprentice at Vickers at Weybridge. I was interviewed at Canbury Park Road by the head of apprentices training Dick Barton, but since I was not considered to have suitable technical qualifications for an engineering apprenticeship I was offered a trade apprenticeship as an aircraft fitter, which I happily accepted..

So on 2nd January 1953, just after my 17th birthday, I went to the Richmond Road works to join Hawker Aircraft as an Aircraft Fitter Apprentice, on the same day as Paul Wilson, on the princely salary of £2/9s/9p a week (£2.49p). Although, as an apprentice, if I made suitable progress I could earn another penny an hour ability money increasing my pay 3s/4d (17p) a week).

All Hawker trade apprentices were given one day a week to study. In my case I went to Wandsworth Technical College to study for Ordinary, and later, Higher National Certificates in Mechanical Engineering. I started in the second year of the three year ONC course but had to go to night school to study and take the examination for the first year in Engineering Drawing as I had no technical drawing experience. Being at Wandsworth meant that on college days I could catch a local bus, or even walk, from my home in Clapham Junction, rather than get a train to Kingston, saving me 1s/5p (7p) a day. During the college midday break I often went to lunch with my mother who worked in Arding and Hobbs.

The introduction for trade apprentices was to spend three months in the Drawing Office Training School, mainly learning about Hawker drawing processes and practices and drawing Hurricane fuselage tube attachment joints and bits. This was followed by three months in the Workshop Training School which was situated on the first floor above the main works. I found this particularly interesting because, as a grammar school boy, I had no practical experience at all of cutting and filing metal. Here we were required to make a couple of workshop tools before we were let loose in the factory.

My first posting into the works was to the Richmond Road Press Shop where I operated hand presses stamping out blanks prior to them being formed into cleats and brackets, and part numbering finished items. When given a job we got a job clock card and clocked on when started and off when finished. The time taken was recorded and the bonus rate determined and added to the salary. The bonus cash earned was added to the weekly salary. Not exactly skilled work but it increased my experience in working with, and respecting, skilled manual workers and the "works" processes. Not a lot more I can say about the press shop except it was a long way to walk to the works canteen for lunch as the Press Shop was positioned near the fence with the Sports and Social Club (now the YMCA) and the canteen was at the Richmond end of the site.

My next posting was to the Fitting Shop at Canbury Park Road in Kingston where I started riveting and assembling small parts for the Hunter. The fitting shop was above the machine shop and I can still remember the smell of the oil from the lathes and other machines which I passed on my way up to the first floor stairs. The work's canteen

was on the opposite side of Canbury Park Road to the main factory and overlooked the railway line into Kingston station. We had to take our own knife, fork and spoon to the canteen for lunch and lunchtimes were spent either walking around Kingston or Canbury Gardens.

After about three months I was posted back to the Richmond Road works onto the Hunter Wing Drilling section. The works foreman at the time was the other Bill Bedford who, I think, recommended me for the Tool Room after a couple of months. (Was he trying to get rid of me?) So my apprenticeship was changed from Aircraft Fitter to Toolmaker Apprentice. I suppose that was a form of promotion although I didn't get a salary increase and wasn't on any bonus system. My lunchtimes at Richmond Road were spent by walking on Ham Common or by the river, sometimes with a pork pie for lunch and sometimes with Steve Bott. I noticed that when walking with anyone to Kingston station after work, we tended to shout to each other, presumably because we were somewhat deafened by the exposure to constant riveting noise in the Hunter wing manufacture jigs area. When being tested for hearing during my later executive yearly medicals I was asked about how many gun shots I was exposed to in the RAF. I think I said about 10 which was minimal when compared to a couple of months on the factory floor at Kingston.

In the Tool Room I was set to work on the Hunter undercarriage jig frame where I helped to manufacture undercarriage door profile jigs with a skilled toolmaker named Bill Lancaster. Bill was a well respected guy who, I remember, would take no back chat from anyone including the Tool Room foreman. Also in the Tool Room at the time was Barry Grimsey who was a well respected toolmaker apprentice and made precision press tools. Whilst in the Tool Room, I was transferred, with some other toolmakers, to the newly formed Plastics Department which was considered to be part of the Tool Room. It was thought that drill jigs could, in future, be more economically made from fibreglass with steel inserts. The work there was so experimental that many of the large items we made suffered by the fluid plastic mixture solidifying as it was poured into moulds, and one of the jobs for us apprentices was to smash up these failures in the storage and dump area by the river at the back of the works.

During my spell in the Tool Room, my HNC results were received and I was given the option of being sent to the Tool Drawing Office or going back to the Drawing Office Training School for 6 months further training before being transferred to either the Production or Experimental Drawing Office at Kingston. I opted for the latter and my apprenticeship changed once more from Toolmaker Apprentice to Trainee Draughtsman.

The DO training school was in the same building where I started my apprenticeship. It was later to become part of the monthly staff dining room and later on the site became the new Project Management Building and the monthly staff canteen. In the early 80s it was one of the first buildings at the Richmond Road site to be demolished prior to the site being closed and all the remaining Engineering design staff moved to Farnborough. I spent six months in this training school before being let loose in the Experimental Drawing Office (EDO) back in Kingston for the remainder of my apprenticeship. It was here I was given the really useful Draughtsman's Handbook without which any draughtsman would be lost. It gave lists of all the metals we could use and their tensile strengths, and sizes and sheer strengths of the rivets and bolts. The Chief Draughtsman at the time was Frank Cross with Harold Tuffen as his deputy. Sir Sydney Camm however, as Chief Engineer, always had an interest in the designs leaving the EDO and he made his presence felt by occasionally ripping up the pencil-on-paper drawings he was not happy with. It was his custom on the last working day before the Christmas break to shake hands with everyone in the office at Kingston. I will always consider it an honour to be a very, very junior part of Sir Sydney's design team.

Every year, around Christmas time, there was an apprentice prize-giving where food and small bottles of beer were made available. I managed to get a book on the design of gas turbine engines and a drawing compass set for achieving my HNC; I think they were presented to me by Sir Frank Spriggs.

When my four years as a trade apprentice ended in January 1957 I was promoted to weekly staff and changed my works 5 figure clock number to a 4 figure staff number. However I missed out of the 1956 Christmas bonus that 'staff' had and us 'works' guys didn't, a grudge I was to bear for some time. My first task in the EDO was to draw the assembly of the main undercarriage bay of the P1121. I proved to be not very good at drawing structural design so I was quickly moved to the fuel system design section under Bill Allen; my first Systems Engineering experience. After the P1121 was cancelled we had a short period of not having much in the way of work, but then, from the Project Office, along came the P1127. I did some design schemes for the negative 'g' trap in the main fuel tank before I finally got my call up for national service in the RAF where I trained as a wireless fitter at initially 14 shillings a week, (would have been 21 shillings but I sent 7 shillings home), and I even had to salute for it, but that is an entirely different story.

ANDY JONES RECALLS HIS TIME WITH THE USAF - SITTING DUCKS

Before my time at Dunsfold I had spent some thirteen years in the RAF, the last two of which had been on an exchange tour with the USAF at Tyndal Air Force Base (AFB) in north west Florida. The unit to which I was attached was a weapons test unit equipped with F-101 Voodoos, F-102 Delta Darts and F-106 Delta Daggers. One trial at Tyndall involved the launching of a very large number of AIM-4 Falcon missiles from the F-106 in order to prove the 'Guide Rate'. Initially the target was a device towed behind one of the squadron's F-101s, and to limit the risk to the towing aircraft the towline was very long indeed. Unfortunately the towline frequently broke and the firing aircraft pilot would be faced with a strange radar return as the target together with thousands of feet of cable sailed back towards him. So it was decided that we would instead use Ryan Firebee drones towing targets on a shorter line. The missiles made the most

of that, frequently ignoring the towed target and destroying the drone instead. As we were firing from about half a mile dead astern of the drone it was quite hard to hit the balance between filming the event and avoiding the debris. We eventually ran out of Firebees but, having been the party guilty of shooting down these unarmed USAF aircraft on a number of occasions I was honoured to receive a very nice certificate of achievement, not from the USAF who had to foot the bill, but from the manufacturers of the drones who were very happy!

BOOK REVIEWS

Harrier 809 - Britain's Legendary Jump Jet and the Untold Story of the Falklands War by Roland White

There have been many accounts of the well known 1982 air war in the South Atlantic but Rowland White has found a new angle by making the exploits of the third Sea Harrier squadron, NAS 809, rather than NAS 800 and NAS 801, the main thread through the story. This is a thoroughly researched history book packed with fascinating detail. Written in an urgent and very readable style the book draws the reader into the action and gives him a vivid appreciation of the experiences on both the UK and Argentine sides of the pilots, radar operators, gun and missile crews, and the ships' officers and men including those of the British Merchant Navy. Many of the airborne and maritime events are familiar but are rendered fresh and exciting here. It is the background stories that are revealing of the manner in which the war was won.

The coverage is comprehensive including the assembly and formation of NAS 809 from scratch in record time, preparation of Atlantic Conveyor, its transfer to Ascension Island and the voyage south, UK training against Mirages, the AIM-9L story, Chilean-UK support including the plan to use RAF Canberra PR9s from Chile, SAS raids on mainland South America and the Falklands, RAF Nimrod and Vulcan operations, SHAR camouflage, the Argentine navy and air force Super Etendard, Skyhawk, Pucara and helicopter operations, UK and Argentine radars and missiles, US-UK support, RAF Harrier involvement, and the shooting war itself concentrating on the RN Sea Harrier FRSMk1s and RAF Harrier GRMk3s. The thinking of the commanders and the political background are also explained throughout and, importantly, the characters of the main players emerge from the action.

This is a big book (480 pages) with an excellent index, a useful 12 page glossary, and an 11 page bibliography listing source material. It is illustrated with 24 pages of very relevant photographs, many published for the first time, 8 pages of helpful maps and a detailed Sea Harrier FRSMk1 cutaway with a key to 239 components.

Unusually I spotted no technical mistakes but would just point out that weapons are not 'bolted' to pylons but 'loaded'; otherwise full marks. The author, Rowland White, is to be congratulated on this outstanding and enjoyable work of narrative history published by the Bantam Press.

Hawker Hurricane - Defender of the Skies by Steve Philpott

The author had long believed that the undoubted importance of the Spitfire in WW2 has overshadowed that of the Hurricane so decided to do something about it. Some fifteen years of research later he published this book which compares the combat successes of the two types.

However, the book is more than that; it starts with a concise but detailed and informative account of the origins, design and development of the Hurricane in its several Marks followed by the production history of the aircraft built by Hawker at Booklands and Langley, Gloster and the Austin Motor Co in England; and in Canada, Belgium and Yugoslavia.

Then comes the core of the book where the author examines the losses and victories of the Hurricane in its 33 campaigns from the 'phoney' war to Yugoslavia. RAF and FAA exploits are described on a day-by-day basis, often with quotations from squadron operational record books and pilot log books. For the aircraft in foreign service - Belgian, Finnish, Romanian, Yugoslav and Soviet - the coverage is less detailed due to the scarcity of information available, but no less interesting.

The book ends with the author's concluding analysis and comparison of the records of the two types; Spitfire and Hurricane, summarised in an Appendix.

There are many rare and some well known photographs as well as numerous campaign maps in colour. The soft-back book is well produced on good quality heavy-weight paper and has a handsome colour cover.

Unfortunately the publisher, Melrose Press, went into liquidation after only a short print run. However, copies can be obtained from the author at 19 Andrews Close, Epsom, Surrey. KT17 4EX for £19.99. Phone 07986 764408, e-mail stphplptt@aol.com.

The Aviation Historian Issue 34

A very striking cover photograph taken from a cabin window showing a couple of RB.211s under the wing of a B.747 introduces Prof Keith Hayward's detailed analysis of the 1971 Rolls-Royce bankruptcy precipitated by problems with the engine for the Lockheed 1011 tri-jet. Chris Gibson has found another British aeronautical curiosity, a 1950s RAE proposal for a ramjet, Mach 4, VTOL, personal transport - yes, really, and Ralph Pegram examines BOAC's requirements relative to the Brabazon Committee proposals. Several new projects are described including Vickers' Warwick Continental using a Barnes Wallis's woven metal 'Geosteel' covering - yes, really, again! And of course,

there's lots more for the aviation history enthusiast, ancient and (fairly) modern.

MEMBERSHIP NEWS

Sadly we report the death of Max Fendt and send our condolences to his family and friends.

We welcome new members Derek Barden, Nigel Came, Mark Oliver and Keith White.

MEMBERSHIP LIST - February 2021

Subscriptions for 2020 - 2021 (£7) are overdue from those in bold below. Please send cheques payable to The Hawker Association to Barry Pegram, 12 Becket Wood, Newdigate, Surrey, RH5 5AQ. If you are **leaving** please let him know by post or by telephone on 01306 631125. Thank you. If you have paid by BACS and this information has not yet reached Barry's records; apologies.

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