THE HAWKER ASSOCIATION

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EDITORIAL

Another New Year for the Association and its Members - tempus fugit. Sadly, but inevitably, a number of Members have died.

I would like to thank several Members who have sent me first class pieces for the Newsletter: Doug Halloway, Peter Hickman and Ron Williams. There has been no space in this issue to include them but readers can look forward to treats yet to come.

Enclosed is the AGM Notice and **MEMBERSHIP RENEWAL FORM** for 2010-2011. Also, there are still a lot of outstanding 2009-2010 subscriptions - PLEASE send your £5 cheques to Barry Pegram at 12 Becket Wood, Newdigate, Surrey, RH5 5AQ, NOW! See the back page of the last Newsletter, No. 24. If your name is in bold, you owe for last year!

Also, please keep sending your contributions to:The Editor, Chris Farara, 24 Guildown Road, Guildford, Surrey, GU2 4EN

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PROGRAMME FOR 2010

Wednesday 10th February	Aviation Art - **Colin Wilson**
Wednesday 10th March	The Harrier Conversion Unit - **AV-M Peter Dodworth**
Wednesday 14th April	**Annual General Meeting** and video
Wednesday 12th May	The Pegasus Engine - **Andrew Dow**
Wednesday 9th June	Summer Barbecue
Wednesday 14th July	Experiences of New Technologies - **Mick Mansell**
Wednesday 11th August	Social with video.
Wednesday 8th September	Social with video.
September ?th	Visit to de Havilland Museum (to be confirmed)
Wednesday 13th October	The Royal Aero Club Trust - **Dick Poole**
Wednesday 10th November	The BAE Systems Heritage Programme. **John L Parker.**
Wednesday **8th** December	Christmas Lunch, Xmas Lunch at the Hawker Centre. **Note date corrected from the 15th.**

Colin Wilson was Production Director at Kingston and is a Member of the Guild of Aviation Artists. AV-M **Peter Dodworth** was one of the original HCU members. **Andrew Dow** has written the definitive history of the Pegasus (see Book Reviews in NL.25**). Mick Mansell** will be remembered in Systems Engineering at Kingston but became Technology Director at Warton**. Dick Poole** was Chief Flight Test Engineer at Dunsfold and now works for the Royal Aero Club Trust. Colin Wilson was Production Director at Kingston and is a Member of the Guild of Aviation Artists.

AV-M Peter Dodworth was one of the original HCU members.

Andrew Dow has written the definitive history of the Pegasus (see Book Reviews in NL.25).

Mick Mansell will be remembered in Systems Engineering at Kingston but became Technology Director at Warton.

Unless stated otherwise, meetings are at the Hawker Centre, Kingston - the old Sports & Social Club - and start at 2.00 pm. Lunch and drinks are available beforehand, tea afterwards, and there is a large, free car park.

INTERNATIONAL POWERED LIFT CONFERENCE 2010

Mike Pryce writes that the IPLC will feature the Harrier in 2010, the P.1127 50th anniversary year. He is looking for contributions to two papers which he will compile: '50 years of the Harrier; what has it taught us?' - a paper presenting the views of designers, pilots etc. plus all the anecdotes Mike has collected over the years, and 'What have we learned from trying to replace the Harrier?' - a review of the positive and negative lessons learned from the many V/STOL projects between P.1127 and JSF.

To think about contributing to this important event please contact Mike on 0161 306 3521, 0780 371 2457 or at Michael.Pryce@mbs.ac.uk.

CAMM WINDSOR MEMORIAL

Planning consent had been granted to the Sir Sydney Camm Commemorative Society for a full size model Hurricane to be installed in Alexandra Gardens, Windsor, Camm's birthplace. The aircraft will be mounted on a plinth and enclosed in a small memorial garden with a plaque of remembrance. The Commemorative Society has recruited Artique Gallery Publishing who specialise in raising money for charity projects. The Gallery is producing a range of Camm associated pictures and cards, using Charles Brown photographs, which will be sold throughout the UK to help raise funds for the Memorial.

By calling the Eton campaign office on 01753 865253 or 857375 you can request the Artique catalogue of fund-raising items, and also donate by credit card to help raise the £60,000 needed to fund the memorial. Please support this initiative.

RAF MUSEUM NEWS

David Hassard has determined that the RAF Museum at Hendon holds what appears to be the complete collection of Hawker photographs up to when the Richmond Road factory closed, as well as many Sopwith glass plate negatives. They are all stored in correct conservation conditions but are not catalogued. David is working with Peter Elliot and Andy Renwick of the RAFM with a view to seeing if, and in what way, Association Members can help with this task. Once the needs and procedures are determined we will be looking for volunteers. If anyone understands the identification codes used on photographs this information would be valuable right now. Please call David on 020 85462715.

CHRISTMAS LUNCH

Another excellent traditional Christmas lunch was enjoyed by 44 Members at the Hawker Centre on 9 December. Our thanks to Ken Batstone for organising this most festive of social of events, including the raffle, and to the YMCA management and staff who set up the dining room, prepared and served the food, and donated a number of bottles.

HARRIER NEWS

According to the Ministry of defence website: "Plans to reprioritise Defence spending to help achieve success in Afghanistan, the top military priority, and balance the books, have been announced by Defence Secretary Bob Ainsworth today, Tuesday 15 December 2009. The enhancements include 22 new Chinook helicopters, **with the first 10 arriving during 2012/13.** In order to deliver these new resources for Afghanistan, the MOD has had to take difficult decisions about areas of Defence that are not linked directly to operations. The number of Harriers will be reduced and the remainder of the aircraft will be moved to RAF Wittering, resulting in the closure of RAF Cottesmore."

The Daily Telegraph commented: "For the first time in modern history, the Government has raided the budget of the Ministry of Defence to fund a continuing military operation. The Royal Air Force will bear the brunt of the cuts which will see an air base closed, a Harrier squadron scrapped and a reduction in the number of military personnel. Liam Fox, the shadow defence secretary, accused the Government of 'catastrophic economic mismanagement. Our defences are being cut, not as a response to a diminished threat – if anything the threat is increasing,' he said. 'The Government that's had four defence secretaries in four years, is now cutting capability as a result of catastrophic economic mismanagement. Our brave armed forces are paying for Labour's incompetence.'

SEA HARRIER NEWS

Art Nalls's team aimed for six air shows in 2009 with XZ439 and completed all of them successfully with no major mechanical problems. An additional display pilot was declared qualified by the FAA, Joe Anderson - Major General, USMC (ret), a test pilot who already had 2,490+ hours in Harriers dating back to 1973. Joe is 63 which probably makes him the oldest currently-flying Harrier pilot in the world. During the year Art received a low-altitude aerobatic waiver in the Sea Harrier, the first ever granted in the United States, which allows manoeuvres beyond 90 degrees angle of bank. Art summed up his Sea Harrier as follows: "All the old AV-8A Pilots out there remember what a kick in the pants the Harrier was to fly, and this one is lighter, faster, stronger and easier to fly than any of those. It's a rocket ship! It's an absolute pleasure to fly!"

HAWK NEWS

The Red Arrows team of nine pilots for the 2010 season, led by SLdr Ben Murphy, for the first time includes a woman pilot, FltLt Kirsty Moore, although the RAF has had female aircrew for nearly two decades. Selection for the 'Reds' is a considerable achievement in itself as each year 30 - 40 pilots apply for the very few vacancies. Flt Lt Moore, a Tornado GR4 pilot, has an MSc in aeronautical engineering and has seen combat in Iraq. Her father is a Tornado navigator who was shot down and captured in the first Gulf War, and her husband is an RAF advanced weapons instructor. The Association can look forward to a talk from her once she has had time to relax a bit.

The 221st, and last, T-45 Goshawk was delivered by Boeing to the US Navy on the 20th October 2009 in a ceremony at St Louis. The centre and rear fuselages, wings, air intakes, canopies and windscreens had all been built by BAe and BAES over the past twenty years. BAES continues to provide in-service support via Boeing. Future upgrades are a possibility.

New customers for Hawk are being sought, one of the biggest opportunities being the Advanced European Jet Pilot Trainer (AEJPT) programme to serve nine European nations (Belgium, Finland, France, Greece, Italy, Portugal, Spain and Sweden) requiring 100 - 150 aircraft. BAES is responding, with the Hawk AJT/T2, to a Request for Information (RFI). Collaborative agreements have already been reached by BAES with industry partners on the Continent. The in-service date is expected to be 2014 with a Request for Proposal (RFP) in late 2010 - early 2011. BAES has also responded to two RFIs issued by the USAF for a T-38 Talon replacement for which there is no suitable indigenous aircraft. Some 350 - 500 are required to be in-service in 2017 and an RFP is expected early in 2011. Discussions are in hand with potential US partners. Both requirements are for complete training systems. Also, Poland is looking for a new lead-in fighter trainer which might be for new or second-hand aircraft. In the latter case upgraded Finnish Hawks might be offered. A middle-east country is also seeking new trainers.

An upgraded and more capable software standard has been delivered for the South African Hawk Mk120 fleet's navigation and weapons system (OC3D). The system was developed in South Africa by Advanced Technologies & Engineering and BAES.

The last of 24 BAES built Hawk Mk132s for India was handed over in October 2009. It was actually the first aircraft, HT001, which was retained in the UK (as ZK121) for nearly three years as the type development and instructor training aircraft.

The Royal Navy Hawk fleet of six aircraft at RNAS Culdrose has been carrying a special 'Fly Navy 100' livery throughout 2009 to mark the centenary of the 'Fleet Air Arm'.

SEA HAWK & SEA FURY NEWS

The Royal Navy Historic Flight's Sea Hawk was reunited with its overhauled Nene and flew at some end-of-season displays. After winter maintenance it will be back in the air in spring 2010. Their Sea Fury, VR930, is waiting for its Centaurus to be returned from Vintage V12 in California where it is being overhauled. Return is expected in early spring 2010.

HURRICANE & FURY NEWS

The Battle of Britain Memorial Flight's Hurricane IIB, LF363, is going abroad to join the Indian Air Force Historic Flight. In return a Hurricane MkI is being repatriated to the UK to be rebuilt for the BBMF.

The Air Accident Investigation Branch (AAIB) has issued its report on the crash of Hurricane XII BD707/G-HURR at the Shoreham Air Show in September 2007. It says that the crash was probably due to the pilot attempting an unplanned rolling manoeuvre whilst tail-chasing another Hurricane. The air speed was adequate at the start of the manoeuvre but the nose-up pitch attitude was insufficient to enable it to be completed safely in the height available.

The Fury biplane replica, built for The Hon Patrick Lindsay by Viv Bellamy in the early 1980s but seldom seen in public after its first flight in 1985, has been bought by Jerry Yagen's Fighter Factory in Virginia from a collection in Belgium.

NEW RN CARRIERS NEWS

Hull modules for HMS Queen Elizabeth are taking shape at ship yards across the country under the control of the Aircraft Carrier Alliance (BAES, BVT, Thales, Babcock and the MoD). The bow is nearing completion at Appledore, lower Blocks 1 and 2 are in progress on the Tyne, with Block 3 under way at Govan where Block 4 will be started in the new year. Construction of the rudders, stabilisers and sponsons is well under way and the lifts and diesel generator have been completed. Modules for the second ship, HMS Prince of Wales, will be built following on from HMS Queen Elizabeth. However, with the parlous state of the country's finances following Gordon Brown's "prudent" management of the economy over the past decade, cancellation of at least one of the ships must remain a possibility.

VISIT TO ROLLS-ROYCE AND THE HERITAGE TRUST

On 17 September a group of sixteen Association Members, including Gordon Lewis, a 'local', visited Roll-Royce (R-R) Bristol at the invitation of Jock Heron, also a Member, Chairman of the Roll-Royce Heritage Trust (R-RHT). We were met by Jock, Gordon and Ralph Denning at the Whittle House Conference Centre where, as we enjoyed coffee and biscuits after our long drive, we could admire a dismantled Pegasus. All its major assemblies: fan, compressor, plenum chamber etc, were mounted on stands and lined up longitudinally so that the whole engine was stretched out over about fifteen feet; most instructive. Also on show was a very early Pegasus 3, a Pegasus 5 bearing a plaque naming it as an "International Historic Engineering Landmark" awarded by the American Society of Mechanical Engineers and the Institute of Mechanical Engineers, and a current Pegasus 11-61. A lift fan for the F-35B Lightning II and a working model of its associated three-rotating-segment articulated nozzle completed the engine exhibition. There were also a number of models of interest, including the original Wibault Gyroptere engine, the Dornier Do31 which had two Pegasus 5s, the BS100 powered P.1154, a large Kestrel model and a large cut-away model of a Pegasus 11-61 complete with zero scarfe nozzles.

In a conference room Jock Heron told us a bit about the R-RHT which was formed in 1981 and now has five branches representing the companies that were absorbed into R-R. Next came a presentation, on R-R today, by our host, Francis Kearney, Senior Vice President European Business & Aftermarket Sales. There are, he told us, four markets for R-R products totalling £9.1 bn annually: civil and defence aerospace representing 49% and 19% respectively, marine propulsion 24% and the energy industries 8%. Of these markets 48% is original equipment and 42% services. R-R is starting to develop a fifth market, nuclear power. R-R employs 38,900 people in fifty countries, has an order book worth £55.8 bn and annual profits of £880m. In the USA R-R has invested $120m in what was the Allison Engine plant at Indianapolis where there are now 4,000 employees. An important product here is the T-56 turboprop for the C-130 Hercules and other transports.

Francis went on to describe the range of engines currently produced and supported by R-R in all fields. For combat aircraft out-of-production engines are the Pegasus in the Harrier with support to at least 2018, the RB199 in the Tornado and the Viper in the MB339 in large scale service in many countries. In production are the EJ200 for the Typhoon, the Adour for the Hawk, and the lift system (remote fan and articulated nozzle) for the JSF F-35B Lightning II. In development jointly with General Electric (low pressure section by R-R, high pressure section by GE) under US Department of Defense funding is the F136, as an alternative engine for the JSF. Engines are also provided for tactical aircraft, importantly the C-130 Hercules, and helicopters, and of course for large numbers of airliners by Boeing, Airbus etc. There are more than 20,000 R-R military engines installed worldwide. R-R sales are No.2 in the world and No.1 in Europe. Of all the world's installed engines 23% are R-R vs. 33% to GE, the leader.

Next we went to the R-RHT Museum in the Sir Roy Fedden Centre where Jock Heron, Patrick Hassell, the Trust Deputy Chairman, and Peter Pavey, the R-RHT Branch Secretary, showed us round in groups. There are far too many engines to list because the collection covers everything from Bristol's earliest piston engines to modern jets via early Whittle/Power Jets, Halford /de Havilland and R-R turbojets. Some highlights were a Power Jets W.2/700 and a DH Goblin representing early Whittle and Halford centrifugal compressor engines, double sided and single sided respectively. A cut-away Centaurus was hugely impressive as was its gear train displayed separately in a glass case like a beautiful work of art,

which it is. Another work of art was a Pegasus prototype plenum chamber burning combustion unit, a very complex piece fabricated from hand formed and welded sheet metal, which would not look out of place in the Tate Modern sculpture gallery. A rare type on display was a DH Gyron as flown on the Short Sperrin and intended for the prototype P.1121.

R-R Bristol carries out gas turbine manufacture, assembly and test and after lunch in the very nice R-R restaurant we were taken by Mike Chaplin and Jerry Fussel, Process Supporters for Adour/Pegasus and EJ200, to visit the factory. At first sight this looked more like a huge, lofty, quiet, open plan office than an engine factory but as we were shown round some signs of engine build became apparent amongst the computer work stations, component storage racks and benches. However, it must be said that the place was not a hive of activity. The whole building, spotless in every respect, was divided into colour coded areas, a different colour for each engine, all components arriving in containers of the relevant colour so that a wrong item would be immediately apparent. As well as complete EJ200 and Adour engines, which are assembled in the vertical position, the F-35B lift system is also built here. This was altogether a very impressive facility as befits a world-class engine supplier.

Back at the Whittle Centre we said goodbye to our most attentive hosts and thanked them for what had been a fascinating visit from both historical and contemporary technological viewpoints.

MAKING THEM RIGHT - AN ENGINEER AT HAWKERS, 1936 - 1976

This talk covering the life of Charles Plantin was given by his son-in-law, David Hassard, on 14th October to a large audience which included many of Charles's family as well as colleagues from the R&D department at Kingston. After an introduction by Ralph Hooper, who knew Charles well professionally, David started with the early life of his subject.

Charles was born in 1912 in London to French parents, Paul and Madeleine, who had moved there from the south of France to start a business importing luxury goods. At the weekends, only French was spoken at home and French papers and magazines, including 'La Science et la Vie' were enjoyed, ensuring that Charles grew up bilingual with an interest in the arts and engineering. David had brought along a wonderful collection of books, magazines, sketches, drawings and paintings that Charles had owned or created. There was a 'Wonder Book of Aircraft' from 1921 which had an article by Sir Sydney's brother, FJ Camm, on building model aircraft, 'The Clipper of the Clouds' by Jules Verne describing a VTOL aerial ship, and copies of the 'Meccano Magazine' featuring prize-winning models built by Charles from the age of thirteen, although he had been a Meccano modeller since he was five! These included a magnificent Atlantic type locomotive, a streamlined biplane fighter, a submarine and a bascule bridge, all original model designs. The drawings and paintings included remarkable renderings of aircraft, locomotives and ships as well as a detailed sketch of a 'flying wing' airliner, "the Pterodactyl of 2000 AD", done in his teenage years.

Charles and his two younger brothers grew up in Westcliff-on-Sea, Essex, where he did well at school and was set to go to 'Oxbridge' when the financial 'crash' caused a change in plan so he went to the Southend-on-Sea Technical Institute where he won the National Union of Teachers bronze medal for science and mathematics and shone in engineering drawing. He went on to Queen Mary College, London University, where he was awarded a BSc in mechanical engineering in 1934 but stayed to study aeronautical engineering under the famous aerodynamicist, NAV Piercy.

In 1936 he was recruited by Roy Chaplin, Sir Sydney's right-hand-man and also a QMC graduate, to join the Technical Office at Canbury Park Road, Kingston, which contained just eleven engineers: three aerodynamicists, seven stressmen and a weights engineer. Charles was soon at work stressing the Hector wing spars and ribs, calculating the torsional stresses in the Hurricane rear fuselage framework and working on the Henley and Hotspur. His first structural test job was the Hurricane canopy release, under load, at Langley.

In 1939 Charles married Vera Fellowes who he had met at Westcliffe-on-Sea and they set up home in Kingston on his salary of £7.10.0. In 1940 the Hawker design team moved to Claremont House in Esher, to avoid possible bombing at Kingston, and Charles was put in charge of the 'upper' stress office. (Claremont did in fact receive incendiary bombs on the roof and bombs in the garden.) In 1947 he was promoted to Deputy Chief of Research & Development, Structures, soon responsible for 85 staff and running the test rigs at Kingston and Langley.

The Abbey test frame at Langley could take a complete aircraft with the loads applied hydraulically and distributed through 'whiffle tree' linkages. Strain gauges were applied to the airframe and deflections were measured with telescopes. Under such a test the P.1040's rear fuselage failed at only 40% of its design load but once strengthened it was satisfactory. The pressurisation test on the P.1040 canopy caused a near disaster. As the pressure was increased the canopy seals did not fail but the canopy did, showering shards as the canopy exploded. Charles later joked that he had nearly killed the entire Hawker design team! A repeat test with water bags over the canopy only resulted in everyone getting wet as the shards burst the bags; subsequently such testing was done submerged. An exception was low temperature testing when the Farnborough cryogenic chamber was utilised.

Resonance testing of the P.1081 was a landmark in structural testing. Charles and his team devised a method, using eccentric loaded gears, for subjecting the complete aircraft to a series of precisely controlled excitations whilst recording the resonances at key places on the airframe. Following on from these tests he wrote a paper for the Royal Aeronautical Society on resonance testing and the theory of flutter calculation which won the 1952 Edward Busk Memorial Prize for the most valuable contribution on applied aerodynamics.

By 1951 the Hunter was under test in the 'Abbey' frame with loads applied manually via capstans set in pairs which were turned together by the two hands of each operator. Charles, the 'Test Master', was calling out the instructions - such as "three turns 8 and 9" - from his script when he noticed that one wing was going up and the other down; definitely

not correct. The answer was that a fitter was turning his pair of capstans in opposite directions. Some say it took three days to reverse the procedure so the test could be restarted! On the subject of hands, David remarked that Charles, naturally left handed, had taught himself to write with his right hand. The result was that he could explain what he wanted done by drawing with his left hand whilst simultaneously writing instructions with his right.

Bilingual, and smartly dressed, Charles often represented Hawker and HSA at the Paris Air Show, and was frequently an instantaneous interpreter. He also wrote French language versions of marketing brochures for the Hunter, P.1127, Harrier and Hawk.

In 1955, with the advent of supersonics, Hawker purchased a Ferranti Pegasus electronic computer, the third built, which Charles was put in charge of. One of its first tasks was transonic area rule calculations. The same year, with Frank Cross, the Chief Experimental Draughtsman, he crossed the Atlantic by BOAC Stratocruiser to visit Avro Canada, Orenda Engines and the US Bendix Corporation to study North American design and production methods and to assess the ill-fated supersonic CF105 Arrow all-weather fighter with its 25,000 lb static thrust Iroquois reheated turbojet, the latter being a contender for Hawker's equally ill-fated P.1121, both eventually being cancelled. Charles and Frank concluded that Hawker needed to double the size of its design and R&D organisations to keep up in fighter development.

In 1949 Hawker had reoccupied Sopwith's Richmond Road factory from Leyland and developed it with a new front office block and additional buildings. In 1957 Charles got a new test laboratory, a new test frame and his R&D team all together in one place, the test frame work being moved from Langley. Devastatingly, following Defence Minister Duncan Sandys' dictat that there would be no more manned fighters for the RAF, the HSA Board decided to stop funding P.1121 work. The new test frame, named Mithraem after the temple to Mythras recently discovered beneath London, was designed by R&D to be large enough to accommodate an airframe the size of Convair's B-58 Hustler. It was made in Glasgow and erected at Kingston sunk 10 feet into the ground to comply with local building regulations. Hunter fatigue research was the first programme carried out in the frame with computer controlled automatically sequenced load application. Testing was carried out on five Mk4 Hunters and two Mk7s, two at a time. An interesting P.1127 research task was fatigue testing alternative riveted and spot welded wing structures. Later P.1127, Kestrel, Harrier and Hawk structural strength and fatigue tests would be carried out in this frame.

In 1961 Charles was appointed Chief Structures Research and Development Engineer for HSA's Kingston-Brough Division, responsible for aircraft structural strength, fatigue and dynamic R&D work, running the structural test laboratory, the digital computer and the provision of mathematical services to the Design Department. The same year Sir Sydney Camm presented Charles with a clock to mark 25 years service to Hawker and 25 years working together. To cope with the 1962 supersonic V/STOL P.1154 project the R&D department expanded and new airframe test techniques were devised to take account of kinetic heating. Power demands by the heaters were so high that a dedicated cable was to be run from Kingston power station, and strain gauge readings were now needed at the rate of 1000 per second. Charles also wrote the French language version of the P.1154 brochure. However, once again Hawker was hit by a cancellation; this time in 1965 it was Dennis Healey who wielded the axe, on the P.1154. A quarter of the R&D staff had to be dismissed and Charles was so upset at having to tell some of his younger men that they were redundant that his health suffered.

In 1967 Charles moved to the HSA Head Office Design Department, still in the Richmond Road building, as Assistant Company Co-ordinating Engineer (Management & Methods) dealing with metrification, company standards for bought-out parts and value engineering. His fluency in French was still in demand at the Paris Air Show and during visits of French-speaking delegations. His last R&D task was to co-ordinate Harrier and Hawk model spinning trials in the vertical wind tunnel at Lille, France. Charles retired in April 1976 where he was presented by HSA's Technical Director, John Stamper, with a Longines watch and an album of photographs of the Hawker aircraft he had worked on. At the retirement party were colleagues from the early days including Charles's boss for many years 'Roche' Rochefort, Sir Robert Lickley, Roy Chaplin, Harold Tuffen and Ian Nightingale. Charles died aged 92 in 2004.

David's talk was illustrated by many photographs, several taken by Charles, showing his family, his colleagues and his cars as well as aircraft that took his fancy at air shows from 1936 onwards, all of which added to the enjoyment of the large audience. The title for David's talk is taken from a quotation from Camm who said that his aircraft were "always right" and the job of his team was to "make them right." Ralph Hooper has said that he overheard Sir Sydney say that "Charles Plantin is a first class engineer", the only time he ever heard him complement a member of his staff.

David Hassard adds the following footnote: I would like to thank those who contributed anecdotes and those who spoke to me and the family after my talk. We remember the stories but in most cases do not even know your names. If you would like to get in touch with me, I would be very pleased to get your stories properly recorded. Putting this talk together has brought me into contact with some of the interesting people who worked on structural testing for Charles, and later Derek Thomas, but there seem to be very few surviving reports and photographs. If anybody out there has any such material that I could copy, please do contact me and I can pass it on to Brian Indge who is building a record of this work. Also, I must apologise for some caption errors in my talk, somehow Mary Sutton became Helen and, in one place only, Harold Tuffen became Tuffin. David Hassard Tel: 020 8546 2715 E-mail: hassards@talktalk.net

HANDLEY PAGE, SIXTY YEARS OF ACHIEVEMENT: 1909 - 1970

On 11th November Harry Fraser-Mitchell kindly stepped in at the last minute to give this lecture when John Parker, who was to talk on BAE Systems heritage matters, had at short notice to go to the USA. The audience certainly did not lose by the substitution. Barry Pegram introduced Harry by saying he needed no introduction because he was so well known for his aerodynamics work at Kingston and as a founder Member of the Association. But before that he had worked for Handley Page (HP) for many years and is still a leading member of the Handley Page Association. He came to Hawker when the Company closed. There were many similarities, said Harry, between the two companies, including their size and the fact that they both had innovative charismatic leaders - Handley Page and Camm.

Harry started with the origins of the Company. Frederick Handley Page was born in 1885 in Cheltenham to Frederick Joseph Page, who owned and ran an upholstery business, and Ann Elizabeth, nee Handley. From Cheltenham

Grammar School young Frederick went to London and enrolled at the Finsbury Technical College where he studied electrical engineering and became interested in aircraft. On graduation he joined an electrical machinery manufacturer at Woolwich. He continued to study aviation, built flying models and manned gliders, collaborated with other pioneers and eventually, in 1909, set up his own company, Handley Page Ltd , at Creekmouth, Barking. This was the first limited company established for the design and manufacture of aircraft.

Moving on to HP's aircraft Harry described the HP Type A monoplane, the Bluebird, of 1910. This employed the patent, crescent shaped wing, devised by artist-engineer Jose Weiss, based on his study of soaring eagles, to which HP added wing warping for lateral control. The Bluebird not entirely successful even after modification to the type C, and was abandoned. The Type D development fared better but real success came with the tandem two seat Type E, the 'Yellow Peril' of 1912, and the side-by-side two seat type F of 1913. Sadly Lt Wilfred Parke, RN, was killed in the latter when the engine failed in windy conditions resulting in a stall and incipient spin. In 1912 GR Volkert joined HP as Chief Designer, staying with the company until 1948.

With the RFC banned from flying monoplanes HP turned to biplanes resulting in his 1913 tandem two seat Type G 100, retaining the crescent wing planform. The large type L 200 with dual controls and side-by-side seats in a closed cabin was designed to compete for the Daily Mail £1,000 prize for a non-stop flight across the Atlantic. It was built not flown due to the advent of World War I. The subsequent O/100 and O/400 twin engined heavy bombers served the RFC well, some 550 O/400s being built. The even larger four engined V/1500 with Rolls-Royce Eagles in tandem pairs did not fly until May 1918 so was just too late to see action, but served with the RAF post-war. On HP's birthday a V/1500 flew forty people round London, presaging the many civil transport conversions and variants of the O/400, the W series, used in the 1920s. HP himself formed Handley Page Transport Ltd to operate civil O/400s. A new transport design, the O/700 or O7, retained the main components of the O/400 adapted to civil use, and the W8 was a purpose designed airliner. In turn the Hyderabad bomber was a W8 with a new fuselage. Variants also included trimotor airliners and the Hinaidi RAF transport. The all-metal Hinaidi II led to all subsequent HP production aircraft using this method of construction. The W10 airliner was derived from the Hyderabad at short notice for Imperial Airways as they found themselves unexpectedly short of capacity.

At this point Harry diverted from his 'types' route to talk about the Handley Page slot. Dr Gustav Lachman was co-discoverer of the aerodynamic slot with HP and was employed by HP as a consultant from 1921 - 24 and, after a spell in Japan, joined the company in 1929 where he held the positions of Experimental Designer, Chief Designer and Director of Research when he did much work on the boundary layer and laminar flow. Lachman held the German patents for the slot, HP the British. After wind tunnel testing, which showed a 50% lift increase, a fixed slot was fitted to a DH9 (HP17) which demonstrated flight at 38 mph. The HP39 Gugnunc slotted biplane was designed to enter the Daniel Guggenheim Fund's Safe Aircraft Competition. The two finalists were the Gugnunc and the winning Curtiss Tanager, fitted with slots in contravention of the HP patents. After a legal battle Curtiss admitted infringement. The automatic retractable slot development reduced drag in the cruise. In 1928 the HP slot was adopted for all RAF aircraft and was widely used elsewhere including by the US Navy, and the resulting royalties were a significant portion of HP's revenue.

In the years leading up to World War II the Company built the famous and luxurious but slow four-engined biplane HP42 Hannibal class airliner for Imperial Airways, which proved a money-spinner for them on European and Empire air routes. The curious HP50 Heyford twin-engined biplane bomber had its fuselage and engine nacelles attached under the upper wing with a gap between the fuselage and the lower wing, a layout which gave reduced drag and a better field of fire for the defensive guns when compared with the conventional layout. The monoplane twin-engined HP54 Harrow bomber with Lachman's cantilever wing and a fixed undercarriage was adopted by the RAF as a rapidly producible stop-gap type pending the availability of the more advanced bombers in the pipe line.

For the war HP produced the slender and fast Hampden twin engined bomber and torpedo carrier, with its ingenious 'pod and boom' fuselage devised by Lachman, and the outstanding Halifax bomber. This was initially designed for two R-R Vulture engines (HP56) but because of probable delays in the engine programme four R-R Merlins were substituted to give the HP57. The aircraft was produced in many bomber Mks in both Merlin and Bristol Hercules powered versions, the latter being the more successful with some 6,000 built, and as military and, eventually, civil transports by conversion to Halton standard. The HP75 Manx twin engined tail-less research aircraft, conceived by Lachmann as a low drag configuration, but developed by Godfrey Lee, suffered from an extended development period and did not result in the hoped-for rear gun turret equipped bomber defender.

After the war the HP67 Hastings military transport, utilising Halifax wings, was the mainstay of RAF Transport Command and the HP81 Hermes IV, with pressurised cabin and tricycle undercarriage, designed to a BOAC specification which included hot-and-high operations, flew with that airline only until 1954 and thereafter successfully with independent operators on freighting and package holidays. Two Bristol Theseus turboprop powered Hermes Vs were also test flown but the engine was not a success.

In 1947 Godfrey Lee had proposed a swept wing, high altitude jet bomber, with wingtip fins and a small tail unit, which gave rise to OR 230 and was the basis for his revolutionary Victor. In 1951 construction of two Armstrong Siddeley Sapphire powered HP80 (Victor) prototypes started, the first flying in December 1950. The Victor was the fastest of the 'V' bombers, was supersonic in a shallow dive and could carry the largest bomb load (35 X 1000 lb bombs vs. 21 in the Vulcan) Innovations included the crescent wing good for a level .875M and ensuring control at the stall, leading edge flaps, fully variable air brakes and the 'T' tail, an early application of this flawed configuration. The Mk2 Victor was powered by R-R Conways although HP wanted Bristol's Olympus but these were earmarked for Vulcans. At the end of their bombing career Victors were converted to tankers by HSA and played an important role in the Falklands war. A military freighter version, the HP111, was winner of an RAF strategic lift competition but Sir Frederick would not submit to Government pressure to amalgamate his company with HSA or BAC, so the order went to the Short Belfast. The HP115 was a very slender delta designed to explore the low speed handling qualities of such configurations. In thirteen years it made some thousand flights with the RAE at Bedford.

Sir Frederick died in 1962 with his famous Company still independent. Afterwards came the HP137 Jetstream. This was designed to fill a gap perceived in the US commuter market. Powered by two Turbomeca Astazous of 840 hp it proved underpowered so was certified at a reduced all-up weight with rather poor range/payload performance. Before the more powerful Series 200 could be certified the Company failed and a pending USAF order for a Garrett powered version was lost. However, a consortium of ex-HP people bought the Jetstream design rights and airframes and certified the Srs 200. Scottish Aviation subsequently took over and received an order for RAF and RN trainers and went on to develop a Garrett powered version. Successful development and substantial sales success continued when Scottish Aviation became part of British Aerospace.

Harry then explained why Sir Frederick never agreed to a merger. In his talks with HSA in 1960 HP asked 16/- per share from HSA when the market price was 13/-; HSA offered 10/- which HP turned down. At this point the Government cancelled 28 Victor BMk2s so HSA reduced their offer to about 8/- when the shares were trading at 10/-. Now the RAF selected the Herald rather than HSA's Avro 748 but the Government would not pay HP their full Victor contract cancellation claim and the merger talks collapsed. Next HSA offered 5/- which was rejected, the Government cancelled the Herald order and the Company went into receivership. A US company, the Cravens Corporation, took over but not long after the owner died and the business collapsed.

Turning to research Harry described: laminar flow (LF) control work using a suction gloved Vampire, on which full chord LF was achieved, and a swept scale wing mounted vertically on a Lancaster (now in the Battle of Britain Memorial Flight); the proposed HP113 commuter jet; and the HP130, a proposed LF wing conversion on an HS125. Wind tunnel tests were promising but the Ministry would not fund full scale flight tests.

On production development the Hampden pioneered dispersed production and photo lofting allowed the making of the necessary multiple identical jigs. Corrugated sandwich skin was a manufacturing innovation on the Victor wing. On test facilities HP had a huge test frame capable of taking a Victor, carried out model flutter testing using German techniques, and a centrifuge for testing such things as partially filled drop tanks. Harry thought the latter was not very useful, but the Ministry had paid for it; Sir Frederick used to tell his people that he wanted "their heads in the clouds, their feet on the ground, and their hands in the pockets of the Ministry."

On projects Harry mentioned Chief Designer Volkert's 1937 idea for an inexpensive, numerous, small, fast, unarmed bomber which could outrun fighters and so operate with impunity by day or night. This philosophy was rejected by the RAF and the RAE and was shelved. However Air Marshal Sir William Freeman resuscitated the idea and it was pursued by de Havilland as the Mosquito. The HP100 was a Mach 2+ canard reconnaissance bomber project, there was a blended wing short range 'airbus' and the HP117 was an all-wing , laminar flow airliner offering a 30% decrease in cost per mile. The latter concept is receiving renewed interest today.

In conclusion Harry summarised HP's major achievements which included: HP was first Ltd Company established in the UK specifically for the design and construction of aircraft; mass production of large bombers in WWI; development of the slot for wings and flaps; range of successful airliners in the '20s; dispersed production techniques; over 1,500 Hampdens and 6,000 Halifaxes built; 150 Hastings built; the best 'V' bomber; the Jet stream (in other hands); and finally a record 86 years of continuous service with the RAF.

BOOK REVIEWS

An addition to the Warpaint Series, No. 74 by Tony Buttler, covers the P.1127, Kestrel and RAF Harrier Is. This slim 44 page volume is a profusely illustrated concise and accurate history of the development of these aircraft with detailed 1/72nd scale drawings, colour three-views and lots of colour elevations. Amongst the monochrome and colour photographs are many unusual shots not previously published. For modellers there is a comprehensive list of kits, detailing sets and decals. Tables list production batches, technical data, and squadrons and units. Although a bit pricey at £14.95 the book is a mine of information with only a few caption and drawing errors.

Brenda Bainbridge recommends highly 'The Few' by Alex Kershaw, the story of the small number of American pilots who fought in the battle of Britain. However, Brenda has written to the publisher pointing out that the following statement is wrong: "…design of the Hurricane was sir Sydney Camm but sadly he died before he could see how effective his aeroplane was in combat." Confusion with Mitchell, of course.

HARRY HAWKER BIOGRAPHY

Michael Price has noticed that Muriel Hawker's biography of her husband, "H G Hawker - His Life and Work" is downloadable, free of charge as it is out of copyright, at http://www.archive.org/details/hghawkerairmanhi00hawkrich.

MEMBERSHIP & HAWKER PEOPLE NEWS

Sadly we record the deaths of aerodynamicists John Chacksfield and Ken Causer, of Bill Sherwood who worked at Brooklands, Langley and Kingston, and also of Vivian Stanbury who died in January, aged 96, just three years and a day after his wife Cora. Vivian joined Hawkers in 1931 rising to become Camm's Chief Project Engineer in the era of the powerful piston engined fighters and the early jets. He resigned from Hawkers in 1956 to join Rolls-Royce cars as Chief Designer. Another sad loss is Gordon Hudson who died in December. Gordon came to Hawkers from Follands where he had been chief stressman on the Gnat and assistant chief designer responsible for the P.1154 rear fuselage, wing and tail before moving to Kingston where his senior positions included Chief Designer Hawk, Chief Project Engineer Harrier and Chief Engineer Kingston as an Executive Director.

Many will remember Dunsfold test pilot Rod Frederiksen, who died in September. As a Royal Navy Lieutenant Commander Sea Harrier pilot in the Falklands conflict he saw much combat and shot down an Argentine Dagger.

Also from McAir, Wally Bode and Chief Buyer, Bill Thomson, well known to AV-8B men, died in January.

More cheerfully we welcome new Members: David Betteridge, Terry Long and Orde Peter Scott.

MEMBERSHIP LIST FEBRUARY 2010

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