



THE HAWKER ASSOCIATION

NEWSLETTER NUMBER 27 - SUMMER 2010

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EDITORIAL

Kingston's Hawk just goes on selling with a contract for another 57 for India signed in July!

Our Association can now be considered mature; we have held our seventh AGM as reported below. Your Committee hopes it is satisfying your needs and believes so, based on attendances at meetings. However, a bit of feedback would help us in our planning of events. Why not phone or e-mail me?

I'm sorry this Newsletter is later than usual; guess what? I had a computer problem. The result is that there is too much material so, if your contribution - Doug Holloway, Peter Hickman and Ron Williams - is not here, please be patient; it will be.

A Membership renewal form went out with NL.26 many weeks ago...but 113 of you have not yet responded. Please help your hard working Secretary by paying up! Send your £5 cheques to Barry Pegram at 12 Becket Wood, Newdigate, Surrey, RH5 5AQ.

Also, please keep sending your contributions to:

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PROGRAMME FOR 2010

Wednesday 11 th August	Social with video.
Wednesday 8 th September	Social with video.
Wednesday 6 th October	Visit to de Havilland Museum . Meet there at 13.50.
Wednesday 13 th October	The Royal Aero Club Trust - Dick Poole
Wednesday 10 th November	The BAE Systems Heritage Programme. John L Parker .
Wednesday 8 th December	Christmas Lunch at the Hawker Centre.

Note date corrected from the 15th.

The **DH Museum** is found off the M25 at junction 22. It is being specially opened for us and we will be guided. Please contact Barry Pegram (01306 631125) if you would like to come as he needs to know numbers. The entrance fee is £7. The tour starts at 14.00 so aim to get there by 13.50, please.

Dick Poole was Chief Flight Test Engineer at Dunsfold and now works for the Royal Aero Club Trust. Project Manager **John Parker** now has responsibility for BAES heritage activities.

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.

THE 2010 HAWKER ASSOCIATION ANNUAL GENERAL MEETING

This, the seventh AGM, was well attended. Our Chairman, Ambrose Barber, opened the proceedings with his annual statement. He hoped all would agree that we had had another enjoyable year with an interesting variety of speakers covering both history and current affairs. The launch of the Sir Sydney Camm Learning Centre at Kingston University had been attended and our aim of publicising Hawker achievements was achieved here. He thanked the committee members, all of whom stood for re-election, for their services noting particularly Secretary Barry Pegram, Editor Chris Farara and Webmaster Richard Cannon. The Chairman also paid tribute to our President, John Glasscock, who was retiring after six years. He was our very first speaker and had supported the Association by his presence on numerous occasions and also behind the scenes. As a token of our appreciation Ambrose presented the retiring President with the Harrier picture started by Colin Wilson in his demonstration of aviation painting in February.

The Secretary reported on the satisfactory state of the membership and on the good attendances at meetings, all illustrated with coloured viewgraphs, and the Treasurer revealed the Association's healthy financial position with £5628.02 in the bank at the end of 2009.

The Chairman and Committee were re-elected and John Glasscock proposed that Sir Colin Chandler be invited to be the new President. Colin had, John said, been an impressive General Manager of our K-B Division in 1977, had done well in Defence Sales for which he was Knighted, and then went to Vickers and on to EasyJet; he was highly recommended. The motion was carried.

After the meeting a film "Hurricanes Over Russia", made by Roy Perkins and Viv Pottersman for the RAF Russia Association and supported by the RAF Historical Society, was screened. It is the only film documentary about the mission of RAF 151 Wing (81 and 134 Squadrons) to Russia as part of the first British convoy in August 1941. The Russian air force was destroyed prior to the German invasion and Stalin requested aircraft. Some Hurricanes were shipped and assembled, in nine days, at Archangel, others flew in off HMS Argus. They were used to defend Murmansk, an ice-free port. Eventually the Hurricanes were handed over to the Russians and the RAF officers and men returned to the UK with the RN.

BROOKLANDS ANNIVERSARIES INVITATION

The Brooklands Museum is planning to mount an event in the Autumn to celebrate the 70th anniversary of the Battle of Britain and the 75th anniversary of the Hurricane's first flight. The Museum would like to invite any former Hawker employees from the 1935 to 1940 era to attend. If you are one or know one please contact Julian Temple on 01932 857381.

HAM FACTORY OWNERSHIP HISTORY RESOLVED

David Hassard has unravelled the true ownership history of the factory as follows ...

It was built for the Ministry of Munitions as National Aircraft Factory No 2, not No 1, and was rented, not bought, by Sopwith Aviation. At the Sopwith Directors' meeting held on 23 July 1919, "Mr Cary reported that the Ministry refused to continue the renting of the Ham factory and had decided to sell it." The highest price Sopwith would be prepared to consider was thirty per cent of the cost, or £60 - £70,000. The Ministry would not accept this and put the building up to tender. A Leyland offer of £225,000 was accepted by the Ministry late in 1919 and that Company used the factory until 1948.

The Hawker Directors' minutes of 1 January 1948 records that "The Chairman told the meeting that he had now received from the Managing Director of Leyland Motors Limited an offer of sale of that Company's Ham propertyfor the sum of £585,000." This offer was accepted by Hawker. The rest, as they say, is history.

KINGSTON UNIVERSITY "SIR SYDNEY CAMM CENTRE"

David Hassard reports on the opening of this new learning facility ...

Kingston University's Roehampton Vale campus is the current home of their School of Aeronautical Engineering within the Faculty of Engineering. The Faculty of Engineering runs BSc courses in Aeronautical Engineering and Aircraft Engineering, alongside a range of Automotive and Civil Engineering courses. They also run MSc courses and undertake significant amounts of research work for industry and academia.

There are longstanding connections between Kingston University (formerly Technical College and Polytechnic) and Hawker, and for some years, until 1994, the Faculty of Engineering was actually based in the old Sopwith/Hawker factory in Canbury Park Road. On the Roehampton Vale Campus, the University Department of Information Services has recently brought together its high quality library, computing and multimedia facilities into a very modern "Learning Resources Centre" and has chosen to call it the "Sir Sydney Camm Centre" in recognition and celebration of local aeronautical history. As the information and learning hub of the campus, the centre has high specification computers running engineering software and a wireless network for portable devices, as well as printing and reprographic facilities. The collection includes textbooks, monographs and DVDs and electronic access to over 40,000 journals. A reception and helpdesk provides the first point of call for enquiries and advice on study related issues including careers and financial advice and, most surprisingly, the Centre also incorporates a "Learning Cafe". As a result it has become the natural place to congregate on Campus providing a social meeting point for staff and students alongside silent study rooms and group study areas with the latest multimedia facilities.

The high profile opening ceremony took place on 25th March 2010 attended by some 200 invited guests. These included members of the Hawker Association, academic staff from Kingston and collaborating Universities, representatives from the Sir Sydney Camm Commemorative Society in Windsor, aviation industry student sponsors including British Airways, Marshalls of Cambridge and KLM, and the Deputy Mayors of Kingston and Merton. Each attendee was presented with an interesting brochure on Sir Sydney Camm produced by University researcher Bill Downey. During his research over many months he also collected a unique set of 140 photographs which were projected as a looped display during the ceremony. These photographs came from many sources including the Imperial War Museum, the Hawker archive at the Brooklands Museum, the Royal Aeronautical Society, the Times Digital Archive and the Kingston Heritage Centre. For an hour before the opening ceremony, Bill had arranged for a group of people who had known Sir Sydney to be filmed discussing him and his aircraft. Chaired by Professor Brian Cathcart, this was a great success providing a wide range of anecdotes and insights from Ambrose Barber, Dave Edwards, John Farley, Harry Frazer Mitchell, Derek Sims and Duncan Simpson.

The formal opening ceremony started with Kingston University Vice Chancellor Sir Peter Scott and the Head of Information Services Graham Bulpitt explaining the value and purpose of the Centre and their intention to perpetuate the University's link with Kingston's aviation heritage. Ambrose Barber provided an engaging insight to Sir Sydney Camm and his achievements picking out some key events from his career. Bill Downey had also tracked down Chloe Dickson, Sir Sydney's great granddaughter, who spoke of how much she had learned about her great grandfather as a result of this event and her growing pride in his, and Hawker's, achievements. This was followed by excerpts from an Imperial War Museum tape recording of Bill Humble recalling how he became a test pilot at Hawker, his memories of Sir Sydney and the characteristics of some Hawker aircraft he had test flown. This was entertaining and a fitting introduction to his granddaughter, TV presenter Kate Humble, who gave an excellent speech summarising the value and importance of the achievements of Sir Sydney and Hawker in general before being asked to declare "The Sir Sydney Camm Centre" open.

The whole event was extremely well organised and recorded for posterity on film. Invited guests were very well looked after by the university with buffet and refreshments in the Sir Sydney Camm Centre and a tour of the laboratory and workshop facilities. There is every facility you would expect to see in a modern university aeronautical department including wind tunnels, an airliner cockpit simulator and a complete Learjet! There can be no doubt that the new "Sir Sydney Camm Centre" is at the heart of an excellent facility for training future generations of aeronautical engineers and is a fitting memorial to him and to Kingston's aviation heritage.

Writer's note. Copies of the Sir Sydney Camm brochure/handout from the event can be borrowed from the Hawker Association Secretary. The studio discussion film is currently being edited and will be made available to the Association. The University's Department of Information Services plan to develop the looped photograph presentation into a permanent audio-visual presentation for the Sir Sydney Camm Centre. This may also be on display at the Brooklands Museum in time for the 75th anniversary of the first flight of the Hurricane later this year. When ready, Bill Downey has offered to show it at a future Hawker Association meeting.

HAWK NEWS

During David Cameron's visit to India the delayed follow-up order for Hawks was signed. It is for 57 aircraft, 40 for the Air Force and 17 for the Navy, to be built under licence by Hindustan Aeronautics Ltd (HAL) at Bangalore. The order is worth £500 million to BAES and £200 m to Rolls-Royce. BAES will provide engineering services, raw materials and equipment to HAL and support to the Air Force and Navy. The total Indian Hawk purchase now stands at 123 aircraft. In India a new software standard, OFP4, which includes electronic flight reference cards, has been embodied on all 24 BAES supplied aircraft. HAL will build it into Indian built aircraft (6 from kits and 36 built under licence). Former Dunsfold (and Warton) test pilot, Paul Hopkins, is now resident in New Delhi, with his family, in a Business Development role.

An RAF Hawk TMk2 (Mk128) recently visited Poland on the occasion of a conference weekend marking the 85th anniversary of the founding of the Polish Air Academy in Deblin. The Polish Air Force is looking for a replacement for its ISKRA TS-11s suitable for training their F-16 pilots. An RFP for 16 aircraft is expected.

Flight trials of the Hawk TMk2 on-board simulation system, covering air-to-air radar, radar warning receiver, countermeasures dispensing system, surface-to-air missiles and a range of weapons, have been completed; release to service will be in October. Work has begun on BAES's £111 million In-Service Support contract to support and maintain the RAF's 28 Hawk TMk2s. BAES is responsible for ensuring that the fleet is available at RAF Valley for training RN and RAF fast jet pilots. Managing Director of Training and Hawk UK Business is Kingston man Martin Rushton. The first Hawk, XX154, resplendent in black, is now flying with the Empire Test Pilots School at Boscombe Down.

In Australia the tenth anniversary of the Hawk Mk 127 has been celebrated. The first of 21 Australian built aircraft made its maiden flight on 12 May 2000. Twelve were supplied direct from BAES in the UK. Now 18 aircraft operate from RAAF Base Williamtown in New South Wales and 15 from RAAF Base Pearce in Western Australia.

In Canada the Hawk Mk115 fleet leader is approaching 5,000 flying hours in just 10 years - about 10 hrs per calendar week. The Hawks operating from Moose Jaw, home of the NATO Flying Training Centre run by the Canadian Government with Bombardier, are used for advanced flying training fighter lead-in training.

During the FIFA World Cup in South Africa SAAF Hawk Mk120s flew combat air patrols over all 64 matches

SEA HARRIER NEWS

Art Nalls continues to operate XZ439 successfully and it was recently the highlight of the Fair St Louis air show. The USMC gets about 1,000 requests each year for Harrier appearances at air shows, more than for the USN Blue Angels and the USAF Thunderbirds combined, but can only satisfy about 12. Consequently Art has no trouble finding slots; they come to him.

A Sea Harrier FA2 is on display at the Tate Modern gallery in London. It is suspended with its nose pointing straight up. Apparently only in that way can its beauty be appreciated, and that makes our creation a work of art credited to the 'sculptor'!

SEA FURY NEWS

The Fly Navy Heritage Trust has formed the company Naval Aviation Ltd through which the FNHT can acquire assets and trade. Through the generous support of a benefactor a Sea Fury T20 two seater, VX281, has been bought. Its primary role will be to familiarise pilots before they fly the Trust's single seat FB11. Its secondary role will be as a substitute at air displays for the FB11 should it be unserviceable.

F-35 LIGHTNING II NEWS

Earlier this year, on 7 January, Graham Tomlinson, after taking off from NAS Patuxent River in aircraft BF1, performed the first F-35B in-flight conversion to the STOVL mode. Following a progressive flight test programme the first hover was achieved on 17 March, followed by a slow landing. The next day Graham, after a short take-off, set up a one minute hover at 150 ft from which he carried out the type's first vertical landing. On 16 June the F-35B achieved supersonic speed for the first time. The programme is being managed by Member Mark Gerrard, once a flight test engineer at Dunsfold.

TREBLE ONE HUNTER APPEAL

Roger Topp tells us that a Black Arrow Hunter, XG194, has been rescued and is being restored at the RAF Wattisham Museum. The team are searching for relevant hardware, photos, publications, personal articles and even anecdotes to aid the restoration and assemble a museum exhibit. Please contact Maggie Aggiss, the Chairman of Wattisham Museum, at maggieaggis@hotmail.com if you can help in any way.

AVIATION ART

This was the simple, rather dry, title of Colin Wilson's talk on 10 February; but it was much more than this. The audience was delighted with a demonstration, creating from scratch a painting featuring a Harrier, accompanied by the speaker's tips on his very successful method, and personal reminiscences of his life with 'Hawkers'. Having started in the aviation industry as an engineer Apprentice with Vickers he moved to Flight Development at Dunsfold in 1966 joining your Editor as one of Fred Sutton's engineers. Already a competent self-taught amateur artist, here the Harrier became his subject. He observed the aircraft out of the office window, at close quarters on the airfield and in the Experimental Hangar. With the blessing of the unforgettable Len Harsey and Alan Wigginton he made many sketches during the lunch hour. For your Editor Colin agreed to do a demonstration for a Guildford painting group, the first time he had attempted such a thing. The 'demo.', a very atmospheric painting of a Sunderland, was a great success and Colin went on to give more talks and demonstrations. His work progressed so well that in 1976 he became a full Member of the Guild of Aviation Artists having been introduced by the great Roy Nockolds.

In 1977 Colin was posted to St Louis as the Company's Senior Management Representative at McDonnell Aircraft, returning to Kingston in 1980 as the AV-8B Project Engineer. His career in BAe took-off in 1983 when he was appointed Production Executive Director for Kingston and Dunsfold, and three years later he was promoted out of Kingston to become Headquarters Projects Director. After that he held directorships with the Dynamics Division, with BAe Systems & Equipment and with Naval Systems & Services. His final posting was as the President of BAe, Japan. His career presented him with new painting opportunities and he brought along many examples of his work.

On Colin's easel was his stretched canvas already prepared with a sky and earth ground on the white base. This must be dry before the drawing commences so it had to be done in advance. The first step is a composition plan, in this case an 'L' shaped format with the horizon one third of the way up. Placing the nose of the aircraft through the centre point of the canvas and blurring trailing edges gives an impression of speed. The subject is drawn lightly by brush in a neutral colour using a turps (oil of turpentine) and paint mixture. Shadows are blocked in and the cloud formations outlined, an important component in Colin's work.

The sky and landscape are then worked up round the aircraft, mixing colours on the canvas and working from thin to thick paint making sure it doesn't dry out which would make working the paint difficult. The aircraft is then tackled in greens, blues and greys adding the coloured details - roundels, ejection seat triangle, fin flash and so on. At this stage artists' painting medium (poppy seed oil) is mixed with the paint to speed drying. Finally the highlights are added to give modelling and indicate the curved surfaces.

Models of the subject can be a great help in getting the aircraft to look right. This and the 'sit' of the aircraft are most important, as, of course, is the overall composition of the picture.

Throughout the demonstration Colin spoke of his experiences in painting and at work, and this account can only aspire to giving the flavour of what was a fascinating and entertaining afternoon with a professional artist. The vote of thanks was given by the Editor.

THE HARRIER CONVERSION TEAM

On 10th March Air Vice Marshal Peter Dodworth CB, OBE, AFC, gave a very nostalgic talk to the Association on the early days of the Harrier in the Royal Air Force. After achieving a physics degree at Leeds University Peter joined the RAF flying Hunters with 54 Squadron and Gnats at RAF Valley and with the Central Flying School (CFS). In 1969 he was appointed Flight Commander of the Harrier Conversion Team (HCT) and became Commander of the Harrier Operational Conversion Unit (OCU) Advanced Squadron at RAF Wittering. Further Harrier involvement was as the Harrier Staff Officer in RAF Germany, the Officer Commanding Operations at Wittering, Air Commander in Belize and CO RAF Wittering. His career continued upwards through many senior positions until he retired from the Service as AV-M in 1996.

Peter outlined early V/STOL developments up to the Hawker Kestrel and its Evaluation Squadron. The Harrier GRMk1 was a Kestrel development to Air Staff Requirement ASR 384. It was powered by the Pegasus 6/101 of 19,000 lb thrust, a considerable increase over the 15,500 lb Pegasus in the Kestrel. It was equipped with the very latest avionics including an Inertial Navigation System, a Weapon aiming Computer and a Head Up Display, a very good item made by Specto, and was armed with two 30 mm Aden guns and a variety of external stores.

The Harrier GRMk1 was released for service in April 1969 and shortly afterwards participated in the Daily Mail Trans-Atlantic Air Race organised to commemorate the 50th anniversary of Flt Lts Alcock and Brown's first non-stop flight. On 5th May Sqn Ldr Tom Lecky-Thompson took off vertically in XV741 from St Pancras railway station and with in-flight refuelling landed vertically in New York's Bristol Basin. The race was from the top of the London Post Office Tower to the top of the Empire State Building; Tom's winning flight time was 6 hrs 11 mins. From west to east Sqn Ldr Graham Williams using XV744 made it in a flight time 5 hrs 49 mins, but was beaten by an RAF Phantom. Ferry wing tips (18 ins development versions) were used to improve cruise performance, the only time they were used in service.

The Harrier Conversion Team started training at Dunsfold in January 1969 under the tutelage of the then Deputy Chief Test Pilot, Duncan Simpson, the four pilots were: Sqn Ldr Dick Lebrocq, the speaker then Flt Lt Peter Dodworth, Flt Lt Bruce Latton and Flt Lt Richie Profit. There were ten weeks of ground school at Dunsfold (in the Product Support Training School where John Fozard lectured on the aerodynamics of jet V/STOL), Bristol, Ferranti and other suppliers of equipment. From these the students devised future ground school lectures. The flying started with a Hunter refresher at RAF Chivenor, followed by a six hour hover and transition course on Whirlwind helicopters at RAF Tern Hill. Back at Dunsfold there was Dove flying for local area familiarisation then eight hours in the Harrier. Firstly a conventional flight, with Duncan flying chase in a Hunter, and a 160 kn conventional landing, VTOL press-ups and

hovers, translations and transitions, rolling VTOLs, STOL flights from the runway and grass, and VTOLs from a metal pad amongst Dunsfold's trees. All airfield flying was filmed and Duncan was in radio contact from the tower. The aircraft were not equipped with functioning weapon systems so there was not much to do away from Dunsfold. When pressed on this Duncan said, "Do anything you like as long as it's above ground level." The finale was a vertical landing on a pad in a wood near Boscombe Down. In parallel with the flying RAF ground crew completed an intensive course at the HSA Dunsfold training school.

On 16th May 1969 four Harriers departed to RAF Wittering where Hunter Squadrons were converted one Flight at a time. VTOL and transition training was done at West Raynham using the old Kestrel pads as the Wittering concrete was not up to standard. As yet there were still no two seaters so extra sorties were necessary. The Harrier was not intrinsically difficult to fly but it offered fierce acceleration. The use of nozzles was instinctive but the need to add power during VLs, rather than pulling the nose up, was not. Also the need to eliminate yaw in semi-jet borne flight to avoid running out of roll control power was new. Hunters, or Harriers for slow landings, were used for chase and a communications caravan with an instructor was placed by the VTO pads or STO strips. All early take-offs and landings were filmed for instructional purposes. As aircraft were equipped so INAS, weapons, recce and air combat were added to the syllabus. The instructors were involved in Harrier deliveries from Dunsfold to Wittering, flight testing and air displays and also gave ground school lectures. Students found the Harrier exhilarating to fly, with new things to do, like VIFF (vectoring in forward flight).

The converted pilots became the staff of 233 OCU which really got into its stride when the first two seat TMk2As arrived in October 1970. These had the uprated Pegasus 10/102 with an extra 1,500 lb thrust, enough to balance the extra weight. At the end of 1972 the Harrier GRMk3 and TMk4 were created by installation of the Pegasus 11/103 with 21,500 lb thrust. The LRMTS (laser rangefinder & marked target seeker) modification was fitted at the same time.

The OCU course lasted six months with one week of helicopter flying, ground school, flight simulator and 75 hours of Harrier flying. The Basic Squadron covered V/STOL, instrument, formation, night and air combat flying, while the Advanced Squadron added low level navigation, attack profiles, reconnaissance (port oblique and pod), weapons (cannon, SNEB rockets, cluster bombs), STOs from taxiways, roads and strips, VLs on MEXE pads and RVLs on strips. With this training pilots went to the squadrons fully capable. There were also Instructors courses.

The OCU courses were very effective, the success rate was similar to or better than other aircraft, V/STOL was not the problem forecast, and the course really reflected squadron use.

Peter then moved on to early GRMk3 service. RAF Germany became highly skilled at field operations, deploying forward from the main base. The Field Wing Operations Centre controlled three squadrons each with two sites (6 sites total) housing six aircraft (36 aircraft total). Each site was stocked with consumables; fuel weapons etc. The Harriers flew STO/VL from metal strips and pads in army training areas for training but in wartime would have flown from hard surfaces; roads, car parks etc. Pilots remained in the cockpit for six 40 minute sorties with 30 minute turnrounds including debriefing, briefing and provision of new maps, with the INAS kept running on ground power. In this way ten sorties per aircraft per day were achieved vs. four sorties when operating from the main base.

In the mid 1970s Belize, previously British Honduras, was under threat from neighbouring Guatemala. Harriers went out in support, returned to the UK then went back to Belize and stayed. There were 300 RAF personnel, four Harriers, four Rapier missile units and four helicopters. Harriers were needed because there were no diversion airfields and Harriers could land almost anywhere. They operated from hides on sites.

Peter closed by briefly touching on the Falklands campaign where RAF Harriers flew tanked 3,500 mile positioning legs. Weapons used included the new laser guided bombs with targets marked either by the aircraft's LRMTS or Special Forces ground designators. At the end of the war Sidewinders were carried in the air defence role from RAF Stanley.

The vote of thanks for this well illustrated and enthralling talk was given by Duncan Simpson who had been so intimately involved in Harrier development and introduction into service.

THE EARLY YEARS OF THE PEGASUS

Andrew Dow, or George as he is known, author of 'Pegasus, the Heart of the Harrier', came to talk to the Association on May 12th. Of his thirty years in the industry, the last sixteen were as business manager for the Pegasus and that is why he came to write the history of the engine.

The story had its real start, said George, in 1953 when NATO, at the depths of the Cold War, realised that the acquisition of nuclear weapons by Russia and her allies required a review of NATO defence policies. A group from the American army and air force, the British army, and the French air force, known within NATO as the 'four hot colonels', was given the task of researching the subject and making recommendations.

Looking at air operations they found that long concrete runways and all their facilities were highly visible, highly vulnerable, and not easily defended against tactical nuclear strike. The colonels made their recommendations laying great emphasis on mobility and the dispersal of aircraft away from airfields. No technology for vertical flight existed and the armed helicopter was still many years off. The best that could be done was a fighter that could operate off grass fields. This led to a NATO specification resulting in the Fiat G91, powered by Bristol's Orpheus engine, and in working relationships between NATO and Bristol which were to be crucial to the birth of the Pegasus.

One of the four hot colonels, Pierre Gallois, was the senior air assistant to the French Defence Minister. It was one of Pierre Gallois's jobs to be in close contact with the French aviation industry, and from time to time he met a USAF Colonel called John Driscoll, who was the senior air officer in a NATO organisation based in Paris, the Mutual Weapons Development Agency (MWDA), funded by the Pentagon in support of NATO. Another contact was a former French aircraft manufacturer, of a particularly inventive turn of mind, called Michel Wibault.

Wibault was about 56 or 57 when he was made aware of the NATO requirement for truly dispersible high performance aircraft. Wibault was highly creative and in 1919 built his own aeroplane and the following year created his own company. He remained in business until 1934 when he sold the company to Louis Breguet. He then worked as a consultant until the invasion of France in 1940 when he and his wife Marie Rose escaped to England. Marie Rose was very much a society woman in pre-war Paris and she had something of a reputation among wealthy men. Among her many friends was Thomas Hamilton, who spent a lot of time in Paris to promote his propellers.

In London General de Gaulle appointed Wibault Technical Director of 'France Forever', an organisation aimed at galvanising American support for occupied France; so the Wibaults moved on to New York. Michel got a job with Republic Aviation and joined Alexander Kartveli on the design of the XC-12, later known as the Republic Rainbow, and on the little Seabee amphibian. Thomas Hamilton introduced Marie Rose to Winthrop Rockefeller, and she in turn introduced him to Michel. That resulted in Rockefeller supporting Michel as an aviation consultant for the rest of his life.

In the early 1950s, while still in America, Wibault started to look at vertical flight and over the next few years took out four patents, funded by Winthrop Rockefeller's Vibrane Corporation which provided support to Wibault. In his fourth 1955 patent application Wibault arranged his machine to have four centrifugal compressors, two in tandem each side, mounted on transverse horizontal axes. The compressors were arranged around the centre of gravity of the aircraft and were contained in casings which could be turned on their axes so that the exit nozzles could discharge down, or to the rear, or at any angle between. (ie what we now call vectored). The engines were shaft turbines, driving through gearboxes, with provision for one engine to drive pairs of compressors. He had a look at the Rolls-Royce RB109, which was to become the Tyne, but later realised that a single BE25, the Bristol Orion, would provide all the power that he needed. As a result he had exchanges with Bristol on its performance.

By this time, John Driscoll of MWDA had met Wibault and advised him to concentrate on combat aircraft. This advice was timely, because not only was the need for a vertical take-off fighter emerging from the work of the four hot colonels, but Wibault had by then made a fundamental breakthrough in powerplant geometry. So he set about designing a realistic aircraft and seeking support for it. He talked to the French Defence Ministry, and although Colonel Gallois and René Pleven supported him, they made no progress because the Air Staff seemed more impressed with the work at Rolls-Royce Derby on lift jets. He also went to French aircraft manufacturers but they were more interested in what the Air Staff wanted, and to Charles de Gaulle, who had yet to become President of France but who Wibault thought could influence things, but de Gaulle told him that there wasn't any money.

When eventually he had come up with a firm proposal, Wibault went back to John Driscoll who was spending MWDA money on the Bristol Orpheus for the G91 and having frequent meetings with Stanley Hooker and Bernard Massey, the designer of the Orpheus. So Driscoll invited Wibault to one of those meetings and had each make a presentation: Hooker on his engines and Wibault on his VTOL concept. That was the moment at which the partnership was formed: Wibault of the inventive, imaginative mind, and Bristol Aero Engines, purveyor of powerful lightweight engines.

Wibault produced a brochure, dated March 1956 and a copy was sent to Hooker who passed it to Gordon Lewis, his projects man, for his comments. On 27 July 1956 Hooker, Massey and others attended a meeting in Paris with Wibault, at which Hooker said that he was so convinced of the correctness of Wibault's proposals that he was having specifications and drawings produced on the design for a centrifugal compressor engine as proposed by Wibault, on condition that the subsequent development programme was conducted by Bristol. However, Lewis disagreed with the four centrifugal compressor scheme and favoured an axial Olympus compressor/fan, with its own intake, driven by the Orion via a gearbox and discharging through just two nozzles, one each side. Hooker looked at Lewis's scheme and told him to go to see Wibault. Lewis found Wibault friendly and helpful, and he quickly produced a sketch of the Gyropter with Lewis's proposal embodied.

A copy of Wibault's March proposal had gone to Winthrop Rockefeller who asked Professor John Markham of the Massachusetts Institute of Technology to examine it. On 9 August Hooker and others met Markham in Paris and explained that Bristol now wished to take the route proposed by Lewis. When he was told of this, Wibault's reaction was that, while he still thought his layout was more efficient, he felt sure that an association with Bristol was the best possible solution for common benefit.

Things moved quickly. Towards the end of September Hooker and John Innes of the Business department went to talk terms with Wibault and they also discussed the prospects of external funding for the work Bristol was to undertake. MWDA was thought to be one of the possibilities but there were others. After some discussion it was agreed that Bristol should prepare a patent specification. This was done by Robert Jaggard, the company's patents administrator, and Lewis, and was filed on 29 January 1957 in the names of Michel Wibault and Gordon Lewis. At Jaggard's insistence a second pair of nozzles was added at the end of the jet pipe.

The Project team in Bristol at that time, under Neville Quinn, consisted of Gordon Lewis, Basil Blackwell, Freddie Pitts, Pierre Young, and Charles Marchant. Neville Quinn played a vital role in persuading the others that this was a good project, and in persuading Lewis that he should pursue it. It soon resulted in project BE48, complete with gearbox. But thinking moved on. More engineers, such as Ralph Denning, Arthur Sotheran, Darrell Williams and Mike Williams joined the effort. The BE48 was drawn on 26 August 1956, three weeks after Lewis's first proposal, but it was soon realised that the Olympus fan would be better if driven by its own power turbine. This could not be done if the Orion was retained. The Orpheus was seen as a suitable replacement, not least because it had a large diameter shaft through which the shaft of a new turbine, to drive the Olympus fan, could pass. The resulting engine, designed under the leadership of Charles Marchant, was called the BE52 with the Olympus fan as the low pressure system and the Orpheus as the high pressure system. The gearbox was now not needed and much weight was saved. The first design scheme was drawn up on 17 December 1956.

An important matter was to define the performance of the engine well enough to tell potential airframe companies what was being proposed. An Advanced Performance Folder (APF) was prepared for the BE52. Several copies went out, to Wibault who was undertaking discussions with various French airframe companies, and among British companies to Short Brothers, who at the time were developing the SC1, and were seen as experts in jet VTOL. However, Shorts used a meeting with the MWDA to argue that vectored thrust was a bad idea and that money should instead be put into jet lift!! The BE52 design study was soon superseded, in February 1957, by the BE53. Among many changes, it incorporated an increase in mass flow but more importantly it provided for the fan to supercharge the high pressure core of the engine. A single air intake was proposed. This was now the basic engine layout upon which the Pegasus was founded. A new performance statement was produced in March 1957, and a Project Study in June. These were circulated in the industry, in this country (although almost certainly not to Shorts) and in France and America. A copy of the new APF is thought to have gone to Hawker's head office but it did not filter down to Kingston. However, the Project Study (PS17) did reach Kingston, as a direct result of Sir Sydney Camm asking Stanley Hooker what he was doing about VTOL. When he did so, he observed that he was not impressed by the inefficiency of Rolls-Royce's proposals for lift jets.

Hooker sent a copy of the Project Study to Camm, and it was his covering letter that included the memorable statement that "I should need a lot of convincing that there is any advantage in giving the take-off and landing engines a free ride round the countryside." It was the receipt and analysis of PS17 that caused Ralph Hooper to go down to Bristol to talk to Gordon Lewis. July 26 1957 was an important date, for it marked the true start of the remarkable and wholly constructive relationship between Gordon Lewis and Ralph Hooper. At the time Hooper had produced a proposal with a three-nozzle version of the BE52, complete with aerodynamic balances on the two front nozzles. One of the matters that Hooper was keen to raise was the hot exhaust, which he understood was still proposed only as a single cascaded nozzle. He wanted to propose that the hot exhaust should be split, and that it, and its nozzles, be placed much further forward. This was both a problem and an opportunity for Lewis who knew that the engine layout proposed in the Project Study relied upon the lever-arm effect of the hot exhaust to balance the fan discharge which would be lost if the hot nozzle was brought forward. He was also concerned that having the nozzles too close to the turbines could cause vibration problems upstream, and events proved him right on this. He was still reluctant to propose changes from the Olympus and Orpheus components, as a means of containing cost.

But here was a potential, respected and serious customer who wanted something different. Hawker was seen as markedly different from Shorts, who had been treacherous, and it is unlikely that Bristol knew much about the various paper studies being undertaken by French companies. Hawker was seen as very real, and of course there had been a good relationship between Hawker and Bristol for very many years. As a result of this first discussion the engine was redesigned to bring the rear nozzles forward, and place them at the end of a very short jet pipe, alongside the fuselage. This could only be done if the hot thrust could be increased to more or less the level of the cold thrust, because the net vertical thrust of the whole engine still had to pass as closely as possible through the aircraft's centre of gravity.

Gordon and Pierre Young had already realised that the hot thrust could be increased by sending fan air into the core, thus supercharging it. This was a crucial step in the evolution of the engine, and to do this they had to get away from using existing parts. It gave them the chance to make the Olympus fan in mirror-image, to rotate anti-clockwise when seen from the front, and thus incorporate contra-rotation. This was not a new idea, and it is true that Ralph Hooper raised the matter with Gordon Lewis. Once Gordon realised that the engine was going to have to be redesigned, and that the presence of Hawker as a potential customer was a good reason for committing that expenditure, the decision was far easier than if it had been just a paper project. This permutation was called the BE53/2 and in its first incarnation was eventually to be called the Pegasus 1. Any design that preceded it was not a Pegasus. With this new configuration a decision was made to manufacture two engines in No. 4 Shop.

In summary, the evolution of the engine can be seen to have taken four steps from Michel Wibault's Gyropter proposal:

The BE48 replaced the centrifugal compressors with the axial Olympus l.p. compressor, using it as a fan;

The BE52 replaced the Orion and its gearbox with the Orpheus, but retained the separate intakes for the core engine;

The BE53 did away with the separate intake and used the fan to supercharge the core, giving more power;

The BE53/2, the first Pegasus, introduced contra-rotation and confirmed the use of four nozzles rather than three.

All of the discussion between Bristol and Hawker was characterised by a complete absence of not-invented-here problems. In this sense the Pegasus, in its evolution, was very fortunate. It is not a characteristic that has enhanced all engine programmes. By this time, Michel Wibault had little involvement in the evolution of the design. He was still retained as a consultant by Bristol, and as he once declared in one of his letters to Rockefeller, he was better equipped to pursue airframe companies. This he did, particularly in France, educating as many as possible in the virtues of vectored thrust. George went on to cover more of the early history of the Pegasus but space does not allow it to be included and this is as good a place as any to stop. If you want the full story, buy George's splendid book reviewed in Newsletter No.25; highly recommended.

The vote of thanks was given by the editor who thanked George for his superbly researched work.

DEFENCE ELECTRONICS HISTORY SOCIETY

Members with avionics backgrounds may well be interested in joining the DEHS where their knowledge and experiences can help record history in this important field. Contact the DEHS at www.dehs.org.uk or e-mail membership@dehs.org.uk.

NEW BOOKS

Member David Ince has written a new book, "Brotherhood of the Skies", drawing on his personal experiences in the wartime RAF when he flew almost 150 Typhoon sorties; many will remember his talk to the Association in October 2003 (see Newsletter No.5). The book is a study of leadership in action, courage, fear, team spirit and motivation which he and his comrades shared during the war, and it explores elements of air power, Army Co-operation, fighter ground attack and reconnaissance operations, which have been ignored in the past. Copies are available from Grub Street (020 7924 3966) for £20.00.

Late Member John Chacksfield's book "Sir Sydney Camm - From Biplanes & Hurricanes to Harriers" has just been published by Oakwood Press at £12.65 but can be bought direct from them (01291 650444) for £10.95. It is said to tell the aircraft and company story well but to be rather light on biography.

MEMBERSHIP NEWS

Sadly we record the deaths of senior aerodynamicist and wind tunnel expert Garry Lockley who spent some time seconded to Lockheed-Martin working on the JSF/F-35, and the unforgettable John Crampton who after a distinguished RAF career, including Cold War reconnaissance flights over Russia, joined Hawker as Harrier Technical Sales Manager. He was a regular contributor to the Newsletter and spoke to us in 2003; see in Newsletter No.5, "A Few Words from a Sales man."

We also welcome new members: Tom Casey, Bill Downey, Sandy Hay and Tim Sargant.

MEMBERSHIP LIST JUNE 2010

A: Mike Adams, Ken Alexander, Peter Alexander, John Allen, Martin Alton, Peter Amos, Terry Ansty, Alma Apted, Steve Apted, John Arthur, Alan Auld, Bryan Austin, Mike Azzopardi. **B:** Brenda Bainbridge, Arthur Balchin, Colin Balchin, Ambrose Barber, Paul Barber, Ray Barber, Derek Barden, Peter Barker, Geoff Barratt, Graham Bass, Ken Batstone, Dennis Baxter, Dennis Becket, Colin Bedford, Anne Beer, David Betteridge, George Black, Guy Black, John Blackmore, Keith Bolland, Paul Boon, Betty Bore, Pat Bott, Steve Bott, Bob Bounden, Alan Boyd, Pat Boyden, Phil Boyden, Roy Braybrook, Clive Brewer, Laurie Bridges, Doug Britton, Arthur Brocklehurst, Capt. 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