



THE HAWKER ASSOCIATION

NEWSLETTER NUMBER 36 - SUMMER 2013

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EDITORIAL

I am sorry this Newsletter is a bit later than usual (I have had a particularly busy time) but I'm sure you will agree that it was worth waiting for. There is a report on the April AGM, accounts of some particularly interesting talks, articles by Members and news of 'our' aeroplanes, particularly Tempests.

You will see below how the Kingston Aviation Centenary Project is going from strength to strength. We all owe David Hassard a debt of gratitude as, by his hands-on leadership of the project, he has raised awareness of Hawker, in and around the Borough of Kingston upon Thames, to new heights thus fulfilling the principal aim of our Association.

Details of our September outing to the Museum of Berkshire Aviation are given - please let Barry Pegram know if you are going. This is mainly concerned with Miles aircraft including the M.52 supersonic project.

Also, don't miss Harry Fraser-Mitchell's offer of a DVD of his outstanding RAeS Hawk history lecture.

Awaiting space for publication are articles by Allan Abbott, Dave Lee, Peter Ryan and Doug Shorey but please continue to send contributions, preferably by e-mail, to The Editor, Chris Farara, 24 Guildown Road, Guildford, Surrey, GU2 4EN, tel 01483 825955, e-mail cifarara@ntlworld.com.

PROGRAMME FOR 2013

Wednesday 4th September

Visit: **Museum of Berkshire Aviation** (Miles).

Wednesday 11th September

Social & video.

Wednesday 9th October

The Sopwith Story - **David Hassard**.

Wednesday 13th November

A Lucky Aviator - **Heinz Frick**

Wednesday 11th December

Christmas lunch.

PROGRAMME FOR 2014

Wednesday 8th January

Social & Quiz - **Les Palmer**.

Wednesday 12th February

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Wednesday 12th March

Fifty Years of Flying - **Bernie Scott**.

Wednesday 9th April

11th **Annual General Meeting**

The Museum of Berkshire Aviation is on Mohawk Way (off Bader Way), Woodley, nr Reading, Berks, RG5 4UE. Please find your own way there arriving at 11am. Entry is £2.50 for seniors (£3.50 otherwise). If you are going, please call Barry Pegram on 01306 631125 as he needs to know numbers. There is no café on site so bring your own refreshments.

David Hassard has become an authority on Sopwith, **Heinz Frick** flew Lightnings in the RAF before becoming CTP at Dunsfold, you all know **Les Palmer**, and **Bernie Scott** was a Dunsfold TP after an RAF career.

THE 10th ANNUAL GENERAL MEETING - 10th APRIL 2013

Chairman's Report

The Chairman, Ambrose Barber, observed that the Association's meetings, speakers and the social gatherings had met the enjoyable standards now routinely expected of them and expressed appreciation of all those whose efforts had made these things possible, and also of Chris Farara and Richard Cannon who had enabled our wider membership to keep in touch via our Newsletter and our website. An unprecedented impetus had been given to the Association's aim to record and publicise 'Hawker's' historic aeronautical achievements. Heritage Lottery Funding, granted to the consortium led by the Hawker Association, had enabled a programme of education, celebration and recording, starting with the 2012 Kingston Aviation Festival. This had succeeded in dispelling the apparent indifference to Kingston's aeronautical history. David Hassard and his team were to be congratulated for their efforts. 'Hawker' exhibitions and lectures had been held in and around Kingston and there was a continuing demand for more. Oral histories were recorded and there is now evidence of interest in the Hawker Association itself which would be addressed by considering widening our membership a little, proposals for which would be presented at an Extraordinary General Meeting.

Secretary's Report

The Secretary, Barry Pegram, reported that membership was at its highest ever at 389. This was fifteen higher than at the time of the last AGM despite the sad death of nine members. Therefore twenty four new members had been recruited during the year, thanks largely to David Hassard's efforts with the Kingston Aviation Centenary Project and the publicity the Association had obtained during the numerous activities that had taken place. Attendance at the meetings where we had a formal speaker was generally between thirty five and forty, with attendance at social meetings being closer to twenty. These numbers have fallen over the past couple of years, perhaps due to the ageing membership. The highly enjoyable Christmas lunch was attended by fifty seven members and friends. During this lunch the Kingston Aviation Heritage Trust presented to the Hawker Centre a bronze plaque depicting 'Hawker' typers and the 'founding fathers': Sopwith, Hawker Sigrist and Camm. It is now mounted in the entrance hall of the Hawker Centre.

Treasurer's Report

The Treasurer, Martin Pennell, drew Members' attention to the fact that the balance at the end of the year exceeded that at the beginning. Income followed the expected pattern of subscriptions, raffle takings and events proceeds (summer barbecue, Christmas lunch, annual excursion ticket payments etc.) Principal items of expenditure were: liability insurance, running expenses (hire of the hall, stationery, printing, postage, raffle prizes, speakers' expenses), payments to the YMCA for annual events, and travel costs and entry charges for our annual excursion. Overall, the accounts, which had been independently inspected and verified, showed that the finances of the Association were in a healthy state with no need foreseen for any increase in members' annual subscription.

EXTRAORDINARY GENERAL MEETING - 8th May 2013

The amendment to the Association Rules detailed in NL.35 was put to the 26 Members present. Revised Rule 4 was unanimously agreed and is now included in the Hawker Association Constitution and Rules. So, at the discretion of the Committee, persons expressing a strong interest in the aims of the Association may become Associate Members.

SUMMER BARBECUE

Ken Batstone, who organised the event, writes...

On Wednesday June 12th, the annual Summer BBQ was held in the usual venue; the YMCA Hawker Centre. The Members and Guests started arriving at 12.30 for a "noggin and natter" before queuing politely for their food, which was served at 1.30pm; hot on the patio and salads inside. The selection and quantity of the high quality food was generous and although the 44 attendees ate all they could, there were still sausages and burgers left over. The only thing below par was the weather; it didn't rain, but the sun didn't shine either. Attendance was well above last year's and everyone enjoyed the afternoon, Members expressing their pleasure to Committee Members. **Keep Wednesday 11th December clear for our Christmas Lunch!**

KINGSTON AVIATION CENTENARY PROJECT

David Hassard writes...

The Kingston Aviation Centenary Project, which was due to finish in March is running on at least to the end of 2013 and probably beyond. The Project website <http://www.kingstonaviation.org> is attracting significant numbers, not least for the oral history interviews which are beginning to appear there. Demand continues for illustrated talks, over 2,000 people having attended them so far at all sorts of local organisations from schools and clubs to historical societies and professional groups. Thousands of people have attended exhibitions which are continuing around the borough libraries. Watch out for announcements on the Project and Association websites. Many ex-employees are coming forward at these exhibitions with valuable new archive material, photographs and oral history stories. Raising the level of local interest has also generated some unexpected collaborations. The Hawker Association, previously open to ex-employees only, has formally extended its rules to allow people with a particular interest in Kingston aviation to become associate members.

Information panels have been designed for the Tudor Ward Neighbourhood Committee who have paid for them to be erected on the corner of Richmond Road and Dukes Avenue where the major factory was situated for so many years. The project has had discussions with CNM Estates about appropriate aviation themes for the refurbishment of the Gala Bingo Hall. Lastly, the Kingston upon Thames Society has secured access to the aviation workshop recently refurbished as a dance studio by the BalletBoyz for a 2-day exhibition of Kingston Aviation History in its birthplace, Canbury Park Road, on Heritage Open Days 13th and 14th September.

Please get in touch with the project through the website if you want to book talks or collaborate in any way.

HAWK HISTORY

Harry Fraser-Mitchell has DVDs of an expanded illustrated version of his Hawk history lecture to the RAeS available to Members for just £5. Call him on 01252 626996. The fruits of deep research into original archive material by Harry it covers, in considerable detail, all aspects of the project from initiation to today's world-conquering advanced jet trainer. The Editor highly recommends this work.

BROOKLANDS MUSEUM ARCHIVE

Please remember that your Editor is in charge of the 'Hawker' archive at Brooklands. If you have or know of any material relating to Sopwith, Hawker, HSA or BAe he would be very pleased to give it a good home. Reports, photographs, correspondence, publications, drawings, press cuttings, magazines, programmes, artefacts etc, etc relating to all and any aspect of 'Hawkers' are very welcome. Please don't throw anything away until you have asked me; one man's rubbish is an archivist's treasure!

HAWKER ASSOCIATION WEBSITE

As readers are aware the Newsletter comes out only three or four times a year so its usefulness in announcing events and news is limited to things planned well in advance. Of course announcements are made at our monthly meetings but this does not help distant Members or those who cannot attend.

Consequently our website www.hawkerassociation.org.uk, run by Richard Cannon, has become a primary source of short term information for Members. Please do log-in regularly to keep track of what is happening - you wouldn't want to miss anything! If you are not 'on line' why not link up with a member who is and check with him by telephone?

THE FRONT OFFICES AT 'HUNTER HALL'

Bill King is trying to put together for the Association and the Kingston Aviation Centenary Project a history, before memories completely fade, of the people that populated the second and third floors of the Richmond Road factory front offices (nicknamed 'Hunter Hall' by an old friend, ex De Havilland, reflecting the Hatfield view that the posh offices had been constructed off the back of the profits from Hunter) and the events that took place there. The period from the creation of HSA Head Offices (C 1959) to the dissolution of BAe Aircraft Group Headquarters (C 1985) saw revolutionary change for the whole aerospace industry and a changing cast of fascinating people, from Tommy Sopwith to Colin Chandler, as well as a large cast of 'bit players'

Having worked there, for the various corporate Commercial Directors, for almost 15 years, Bill would be very happy to hear from any of his old friends and anyone else who might help him with this task. Published records seem sparse; if there are any relevant archive sources out there that can be interrogated it would be most useful to know. In addition what he really wants is those amusing tales that bring the story and its people to life. Bill can be contacted, for this exercise, on his old business number 01372 805194.

AIRCRAFT NEWS

SOPWITH - The Snipe replica built by Vintage Aviator Ltd in New Zealand is now on show in the RAF Museum, Hendon, Milestones of Flight Hall. A Pup reproduction, built by Bruce and Mary Clarke has flown at Watts Bridge in Queensland. It is powered by a VW engine of similar power to the original's 80 hp Le Rhone rotary.

HURRICANE - Hurricane Mk I, P3351, a battle of France veteran ex the Alpine Fighter Collection, New Zealand, is now based at Cannes- Mandelieu Airport registered F-AZXR. Hurricane Mk IIc, PZ865, 'The Last of the Many' is back flying with the Battle of Britain Memorial Flight after a major overhaul and restoration at Duxford by The Fighter Collection. Curiously, this historic Hurricane is painted in the colours of 34 Squadron, South East Asia Command. A Finnish Air Force Hurricane Mk I, HC-452, is back on display in the Central Finnish Aviation Museum at Tikkakoski after 25 years of storage and conservation. Two Hurricane Mk I flying restoration projects, P2902 and P3717, are nearing completion by Hawker Restorations, Ipswich, Suffolk. Remarkably, Hawker Restorations is responsible for six of the eleven airworthy Hurricanes in the world.

TEMPEST II - MW376 being restored to airworthy condition by Pioneer Aero Ltd at Auckland, New Zealand is now in storage following the death of its owners in an air crash. MW763, nearly completely restored by Tempest II Ltd near Lincoln, is up for sale at £650k. MW404 is being restored at Hooks Memorial Airport, Houston; a Curtis-Wright R-3350 will be fitted instead of a Bristol Centaurus.

TEMPEST V - EJ693 is under restoration by Personal Plane Services, Norfolk, for Kermit Weeks's Fantasy of Flight collection in Florida.

HARRIER - Harrier GRMk3, XV744, of Trans Atlantic air race fame is at the Tangmere Military Aviation Museum being brought up to static display standard. Harrier GRMk3, ZD667, is on show at the Bentwaters Cold War Museum after restoration by volunteers there. Harrier GRMk3, XV753, is at Newquay Airport prior to restoration in public view in the Classic Air Force hangar.

FLYING LEGENDS, DUXFORD

An outstanding display was performed in excellent weather. A highlight was a Hawker formation: a Hurricane Mk I, two Nimrods and a Demon. Unfortunately a fifth aircraft, a Hind went unserviceable. If you have never been to Flying Legends, go next year. It is the best 'warbirds' show outside the USA and is great value as you get entry to the Museum included in the ticket price, which is reduced for OAPs, in addition to a four hour display; and for a fiver you can visit the flight line and photograph the aircraft unimpeded. Heaven!

THE RISE AND FALL OF THE P.1154

Dr Michael Pryce, who has spoken to the Association before on V/STOL topics, addressed Members on 13 Feb on the history of the P.1154, Hawker's (and Ralph Hooper's) thwarted attempt to enter the world of supersonic V/STOL, or, as it would later be termed, ASTOVL. In 1996 Mike achieved an MSc in the history of technology at Imperial College. For his subsequent DPhil at Sussex he studied the P.1154 and later V/STOL programmes. He has been funded by BAES and the US Dept of Defense to study and advise on advanced technology project management, including the JSF (Joint Strike Fighter). He has also advised the UK Government in this field. He now lectures at Cranfield University and teaches MoD acquisition at the Defence Academy of the United Kingdom. He is also a writer and runs the harrier.org.uk website.

Mike started by summarising the UK experience in jet V/STOL; fifty years of P.1127, Kestrel and Harrier design, development, testing, operations and support with exports to the USA, Spain, India, Italy, and asked, why should we look at failure? Most new things fail and looking at failure shows the nature of success. There are technical and political lessons to be learned from failures. The Kingston aircraft heritage from Sopwith to BAe had seen 100 years of fighter design which, in 1957, was interrupted by the consequences of the Duncan Sandys view that the Lightning would be the last UK manned fighter leading to the discontinuation of the P.1121 and Hawker's move into V/STOL.

The P.1154 requirement arose in the early 1960s when wars east of Suez were seen as likely. The political climate was coloured by: the UK financial crisis and a change of government, RAF and RN rivalry over the 'island stance' or carriers, and whether a joint service aircraft should be V/STOL or conventional, and the choice of European collaboration or American alliance. The technical solution would have to meet diverse needs. Meanwhile NATO wanted a supersonic nuclear strike aircraft for off-base dispersal. The RAF were fighting in Malaysia and South Arabia with subsonic Hunters and flying helicopters from jungle bases. What the RAF wanted most was the TSR2 for tactical and strategic use with its nuclear weapons and digital systems. This was not as good an aircraft as many of its proponents would have us believe, said Michael. It had technical problems amongst which was fin flutter requiring a hydraulic damper, and a possible 500 kn EAS limit. And it was ridiculously expensive. What's more, the Weybridge-Warton collaboration was the worst ever.

The Navy had vintage carriers, which had been updated but were too small for modern jets, and aircraft such as the 1940s design Sea Vixen. The five fleet carriers were under-utilised and unappreciated, the RN felt. The operational focus was east of Suez as WW 3 in Europe was expected to be nuclear and short. What the RN wanted most was new large carriers, the CVA-01 class, with new aircraft and a new supporting fleet. This was not cheap.

In government the MoD was in thrall to the new US cost-cutting 'commonality' concept promoted by Defense Secretary Robert MacNamara, an ex-Ford Motor Company 'whiz-kid' (on whose watch the disastrous Edsel model had failed.) The TFX requirement which led to the F-111 embodied this 'commonality'; one airframe was to satisfy jointly both the USAF and the USN. The Conservative UK Minister of Defence, Peter Thornycroft, wanted the P.1154 to be similarly 'joint'. The services were not keen and had to be begged to accept commonality; and Hawker was against it.

Stepping back to 1961, Ralph Hooper drew the P.1150 based very clearly on his P.1127 which had just started flying. It was powered by the BS.100, a Pegasus development with plenum chamber burning (PCB) which utilised Bristol's ram-jet technology to burn fuel in the front (cold) nozzles to produce enough thrust for supersonic flight. Renumbered P.1154 (2 X 27) the design was entered in NATO competition NBMR3 (NATO Basic Military Requirement no. 3). In 1962 the P.1154 was declared the 'technical winner' but France's Dassault Mirage IIIV was deemed 'equal' for work-share proposal reasons! Unfortunately NATO had no money so the competition foundered. Consequently, the UK Government decided to go ahead with a joint RAF/RN P.1154. Like NATO the RAF wanted a low level, single seat, strike fighter, whereas the RN wanted a carrier launched, high altitude, loitering, two seat fleet defence interceptor with a big radar. No workable common aircraft could be devised (Hawker drew six main naval versions including some with twin R-R Speys, and several 'joint' ones although the RAF version changed little). In February 1964 the RN withdrew from the 'joint' P.1154 and selected the McDonnell F-4 Phantom, a choice promoted by Capt Eric 'Winkle' Brown and Admiral Louis Mountbatten. These aircraft were fitted with R-R Speys so they could be launched from UK decks, and cost as much as the entire P.1154RN projected costs! They served from 1969 until 1978.

Building the first RAF P.1154 started in 1964 at Kingston, Hamble and Brough with the BS.100 on the test bed at Filton. During 1964-65 a lot of work was done including wind tunnel tests and equipment development. The aircraft was designed to fit RN carrier and commando carrier lifts as well as Australian, Canadian and Indian carriers with an eye on exports. Next Mike looked at the politics. The P.1154 was developed due to changing military needs and political support. Sir Solly Zuckerman, chief Scientific Advisor to the MoD, did not want the RAF to be embarrassed by Sukarno's supersonic MiG 21s in Indonesia in spite of the fact that they were sub-sonic at low altitude. Harold Wilson who formed his Government in 1964 believed that the Services and the aircraft industry were inefficient. Denis Healey became Minister of Defence. He believed the best way forward was to buy American and jointly develop with France. A '100 day' aircraft projects review of the P.1154, the TSR.2 and the HS.681 was instigated as was a defence review. At the same time the balance of payments crisis came to a head and the 'Gnomes of Zurich' called for economies in return for loans. Consequently the P.1154 was cancelled for Phantoms and some P.1127s/Harriers were ordered for the RAF. TSR.2 was cancelled and F-111s ordered instead with the USA giving favourable 15 year credit terms, which helped the UK balance of payments cash flow problem, and early delivery. Also, the AFVG (Anglo-French variable geometry) fighter was launched as the Government wanted to join the EEC (European Economic Community) or Common Market.

In the end, did the cancellation of the P.1154 matter? The Harrier, and its Sea Harrier derivative, became a great success, operating from existing ships, roads, strips and pads. The P.1154, with its very hot, high energy exhaust could not have done this. However, some saw the Harrier as a backward step. At the time of the P.1154 cancellation, Chief Designer P.1154, John Fozard said: "At this rate I will be Chief Designer of the Sopwith Pup when I retire!" At the time the Harrier was not a secure programme and several hundred redundancies ensued.

Was the P.1154 a supersonic red herring? Kingston and Bristol persevered with PCB in spite of the fears of others, the work culminating in the P.1216 twin boom fighter project but this also came to nought for internal BAe political reasons to do with promoting Eurofighter. Does it matter today? Since the P.1154 cancellation there has been extensive UK ASTOVL work and the UK is playing a very significant role in the F-35 Joint Strike Fighter programme.

The political issues are similar today: carriers, budgets, inter-service rivalry. The same mistakes are repeated. The withdrawal of the Harriers from service and scrapping of their carriers is an example as is the F-35C debacle (changing from the ASTOVL 'B' to the catapult launched/arrested landing 'C') which cost the best part of £100 million - for nothing!

The vote of thanks for this excellent talk was given by Chris Farara who has known Michael since he came to the Brooklands Museum archive when he was doing his MSc.

HAWK T-X FOR THE UNITED STATES AIR FORCE.

On 13th March Paul Hopkins came down from the 'North' specially to talk to the Association about what BAES hopes will be the next big Hawk development - to meet the new USAF training requirement. For the winner of the competition for this aircraft the prize is the sale of 350 - 500 aircraft with a future USN buy not out of the question. Ambrose Barber introduced Paul who was already well known to many present. Paul completed three RAF Harrier tours then attended the US Navy Test Pilot School at Patuxent River after which he was posted to the A&AEE at Boscombe Down where he contributed to the Harrier, Sea Harrier and Tornado service clearance programmes. In 1985 he retired from the RAF and joined the test pilot team at BAe Dunsfold on Harrier GR5 and Hawk development. In 1990 he went North when BAe moved the Hawk programme from Kingston and Dunsfold to Brough and Warton. Flying Hawk, Tornado, Gripen and Typhoon he rose to be Chief Test Pilot Warton in 1998. Retiring from flying in 2005 he moved into project management as Project Director Advanced Jet Trainer (the current T2). He also marketed the Typhoon in Japan and India spending two years in Delhi. Seeking retirement Paul was asked to stay on for one year to support BAES Inc as the Hawk T-X competition was imminent. He finally retired in 2012. Paul added that as a small boy he lived on Ham Common.

Paul started by explaining the precarious position of the US defence budget which has suffered a 10% cut plus the current sequestration cuts of an additional 10% for defence (\$500 billion over 10 years) so all programmes are under great strain. The T-X budget is 'flat lining' at present with no hope of an increase until 2016. Meanwhile USAF training is in trouble. The fighter students start on the Beech T-6 Texan II (essentially a Pilatus PC9) then move to the Northrop T-38 and the two-seat F-16D leading to the F-22. F-16Ds are in short supply and the T-38 of F-4/F-104 vintage is rapidly running out of life and suffering structural problems, with the potential for surprise structural problems that could ground the fleet. The T-38 has been in service since the 1960s, is not sustainable long term, is difficult to fly and not fit for purpose as an F-22/F-35 trainer - but the USAF loves them. The T-X is needed by 2018 with a full operational clearance in 2025 (but these dates are being continually squeezed by the budget cuts), must have a life of 30 years, and be easy to fly like the F-22/F-35. The T-X must be low cost and low risk and be part of a fully integrated air and ground training system (maximum ground time, minimum flight time for economy) with full mission simulation.

The Hawk T-X partners are BAES, L3 Simulation and Northrop-Grumman (N-G). As the programme must be seen to be American, BAES Inc will be responsible for delivery of the overall programme, ground and air. The wings and front fuselage will be built at Sablesbury while N-G will build the back end, undertake installation, final assembly and flight test. Considerable effort has been taken to source US equipments to maximise US content so the product is seen as being American. Competitors are: the Alenia-Aermachi T 100 which is a twin engine (giving high life costs), fly-by-wire (FBW), high thrust-weight ratio, LERX equipped advanced trainer derived from the current production M-346; and the Lockheed-Martin/ Korean Aerospace Industries T-50 which is a big, expensive reheated single engine, high performance, supersonic F-16-based advanced trainer derived from the aircraft in production in Korea for the RoKAF. Also, Boeing is offering a brand new, supersonic, big engine, 'paper' aircraft designed specifically to meet every aspect of the T-X requirement. This will be a higher risk, expensive development project that the USAF wants to avoid but the product will no doubt look attractive and will be 100% US.

Compared with competitors the Hawk T-X would be cheaper to buy and run, has proven reliability, and will be low risk, attributes that the USAF is looking for. The T2 sustained g is marginal and it does not have fly-by-wire controls. In reality the RAF and the RAAF (Australian) achieve all their Hawk training objectives for Typhoon and the F18 at what they regard is an adequate g level and are more than satisfied that students can experience demanding g levels for combat engagements. For the Hawk T-X improved combat/ manoeuvre flaps will increase instantaneous g to satisfy USAF requirements. The Hawk is easy to fly and is very forgiving despite conventional controls and gives the advantage that actual aerodynamic behaviour can be experienced at limiting conditions, whereas FBW does not allow envelope boundaries to be explored.

In the current marketing campaign the Hawk 128/T2 is being promoted. It features: provision for RWR (radar warning receiver), chaff and flares, OBOGS (on-board oxygen generating system), HUMS (health & usage monitoring system), RVSM (reduced vertical separation minimum) compliance, autopilot, digital map, integrated IN/GPS (inertial navigator/global positioning system), NVG (night vision goggles) compatibility, sensor simulation, TCAS (traffic collision avoidance system), centre line external fuel tank, AAR (air-to-air refuelling), data link, FLIR (forward looking infra-red) provision, nose-wheel steering, 10,000 + hrs airframe life and the Adour 951 which features: 6500lb sea level static thrust, automatic surge detection and recovery, optimised full flight envelope handling, automatic start/relight, modular design for easy maintenance and 4000 hrs mean time between overhaul. However, there are a significant number of T2 cockpit components that are long overdue for upgrade, for example analogue standby gauges, so there is plenty of scope to make significant upgrades to reduce cost and improve training value for the next generation of Hawk. As the T-X programme has now slipped by a few years these changes may be incorporated into other export variants in the meantime so reducing development costs for T-X in due course.

The T2 already incorporates significant virtual world flight training by the use of the mission system and data link. The mission system can model radar, electronic warfare and warnings, weapon release and firing, chaff and flare deployment as well as ground based electronic warfare systems and hostile missiles. This information can be shared between up to 10 aircraft and a ground station allowing target acquisition, air combat, ground attack and so on to be realistically practised and observed by airborne and ground based instructors. Students' displays will be contained within the relevant sensor field of view but instructors can see the whole battle area scene. The RAF no longer use practice live weapons on the T2 and the weapon system essentially models Typhoon attributes to deliver realistic multi-role training to a very high and demanding standard. The Hawk T-X will take this concept a stage further.

So ended Paul's most interesting talk to a large, appreciative audience. The vote of thanks was given by Chris Roberts who pointed out that at the time of the VTX negotiations the USAF was required to agree that the Hawk VTX would at some future date be suitable for that service!

AIR TO AIR PHOTOGRAPHY

On July 10th, HA Member Geoff Lee came to talk about his profession - photographer, specialising in air to air work. Geoff started as a photographic apprentice with HSA Kingston in 1975 rising to become Chief Photographer and Head of the Kingston photographic unit in 1990. After the site was closed he started his own company, Planefocus. To date he has logged 500 hours in fast jets, flown in fifteen types with seven air forces and two aerobatic display teams.

Through a series of slides Geoff informed his audience about the practice of aerial photography. Subjects covered include squadron and aircraft anniversaries, special aircraft colour schemes, new weapon fits, weapon and store releases and firings and VIP flights, for Services, operators, industry and magazines. A basic requirement for any mission is to know your chase aircraft. Is it tandem or side-by-side, what are its limitations and endurance, is it aerobatic, does it have side doors, a rear ramp or do you photograph through a canopy or windows (if the latter what is the state of the transparencies), how can cameras be stowed and what are the emergency procedures? You must also know the limitations, endurance and aerobatic capabilities of the subject aircraft. Chase aircraft can be light twins with the doors removed, helicopters with the doors open, military transports like the Hercules with open rear ramps, tandem two-seaters like the Hawk which allow photography to both sides and overhead, and side-by-side two-seaters like the Jet Provost which are limited to photography to one side. Sometimes special under-fuselage camera pods or steerable and zoomable periscope systems are available. When working with open or removed doors and open ramps the photographer is securely restrained to the aircraft.

Various chase to subject formation positions can be used including line astern, line abreast, echelon stepped up or down as well as being part of a vic, box, finger four, or diamond. The subject can perform various manoeuvres relative to the chase, for instance, flat turns away or towards the chase, breaks away or towards, wingovers and verticals. Backgrounds such as mountains or special ground features are very important. It is best to avoid cluttered built up areas and dull weather.

The photographer has a lot of equipment to deal with. Cameras and lenses are carried in a helmet bag. There must be no camera straps to prevent the possibility of snagging aircraft controls etc. Logos and badges on helmets and clothing must be blacked out to avoid reflections in canopies and windows. Spare memory cards and fully charged batteries must be taken. The sortie brief must be carried and, last but not least, a sick bag is essential. For fast jet subjects Geoff uses a Nikon D4 with a back-up D3. His usual lenses are an f2.8 24-70 mm zoom, an f2.8 14 - 24 mm zoom and an f1.4 85 mm. For transport aircraft he uses an f2.8 70 - 200 mm zoom. For fast jets he uses 1/500 sec or faster shutter speeds but for propeller aircraft 1/320 sec or slower to ensure that the propeller blades are blurred. Mostly Geoff shoots single frames but in dynamic situations uses 5 frames per second.

The basic tool is the briefing which is entirely scripted on the ground but may be adjusted in the air. Geoff prepares a 'Powerpoint' briefing sheet with 8 - 9 items; enough for a one to one hour twenty minutes flight with 20 to 30 minutes on task. Each shot is numbered, states the formation and lead aircraft and is illustrated with an example photograph. The sheet is copied for all the pilots involved. The brief is discussed and adjusted the day before the sortie. At the sortie briefing each item and its requirements are discussed in detail including safety actions. Flying clothing is donned including immersion suits if appropriate; you dress to survive. Next a final camera check is carried out and the chase aircraft transparencies are examined for cleanliness inside and out before strapping in. The cameras are then secured for take-off ensuring that there are no fouls with the controls and ejection handle. When airborne keep away from the control column, keep the elbows clear and be in full control of the camera. Geoff recommends using manual in case the auto systems fail. When setting up the shot refer to the briefing serial number, talk clearly and be exact. After the flight debrief thoroughly and fill in the log book.

Before finishing Geoff presented a slide show: '24 hours in the life of a Eurofighter Typhoon' illustrating Geoff's skills at taking outstanding photographs.

GRAHAM GALTON AND HAWKER

The following is based on a memoir by Norma Galton, Graham's widow, written for the Kingston Aviation Festival.

Aged sixteen Graham Norman Galton joined Hawker Aircraft Ltd in 1942, straight from school, when the factory was in Canbury Park Road. His father thought it was a good idea to apply for an apprenticeship with an aircraft company as Graham was very keen on making model aeroplanes, had good results in his Matriculation exam and was good at maths. The scheme allowed him one day off a week to study at Kingston Technical College with a view to becoming a Chartered Engineer. He also attended evening classes three nights a week and eventually achieved his ambition.

World War II was still raging at this point which made things difficult as almost everything was rationed including petrol. Graham recounted tales of his experiences coping with the lack of petrol for his motorbike and the difficulties he encountered when trying to get home to Streatham from Kingston after attending college in the evening. He frequently ended up wheeling his motorbike for miles when his tank ran dry. There was also a complete black-out in force to hinder enemy bombers trying to locate their targets. Unfortunately the inhabitants of the British Isles could not see either. Nearly every household and business burned coal with the consequence that 'pea-souper' fogs were frequent and one could literally see no more than four or five inches ahead, compounding the effect of the 'black-out'.

The enemy bombers were intent on blowing up any factory they could find and it became too dangerous for the Hawker Design Department, where Graham subsequently worked, to continue to be housed at Canbury Park Road. The Department was, therefore, moved to Claremont School in Esher, a beautiful old house. The Chief Designer, the brilliant Sydney Camm, used to call the designers his "boys".

Norma met and married Graham in 1955 and Graham now worked at the new Hawker factory on the Richmond Road near the shopping parade at Ham. By then Graham was a Chartered Engineer having worked his way through the Hawker factory in departments such as the Drawing Office, the Stress Office etc. He and his team were testing fighter aeroplane structures for strength and resilience on huge test rigs. Norma knew nothing of the details of these tests as employees were sworn to secrecy. She was aware that the tests were long and arduous and Graham would come home very tired. The prototype structures were stressed until faults showed up. Graham enjoyed this aspect of his work as he liked working with a team and being 'hands-on'. The test rigs themselves were enormously complex and were designed specifically for the aircraft being tested. Graham's immediate boss at the time was a lovely man called Charles Plantin, a brilliant mathematician and Chartered Engineer. Graham was part of his team for many years and had enormous respect for him.

Recently Norma discovered a patent bearing Graham's name and was fascinated to learn that he and three others were credited with the invention of a means of attaching miniature detonating cord to the hood above a pilot's head in such a way that the hood breaks up in a safe and precise pattern ensuring that the pilot is not injured by the hood fragments when ejecting. For quite a few years Graham had been involved in pilot safety aspects of the fighter aircraft being developed by Hawker and British Aerospace. This involved a great deal of testing at places like Boscombe Down and Pendine Sands where Graham and his team would test the Martin Baker ejection seat installations for the Harrier and Hawk.

Liked and respected, Graham retired at 63 after 43 years of employment by Hawker Aircraft, Hawker Siddeley and British Aerospace, and sadly died of a stroke in 2007 aged 81 after 51 years of marriage to Norma with two daughters.

MEMBERSHIP NEWS

We welcome new members: Melvyn Bluck, John Friend, Valerie Hanscombe, Dennis Hills, Mark Jennings, Ron Mancey and Peter Tews.

MEMBERSHIP LIST AUGUST 2013

A: Allan Abbott, Beryl Alexander, Ken Alexander, Peter Alexander, John Allen, Peter Amos, Terry Anstey, Steve Apted, John Arthur, Alan Auld, Bryan Austin, **B:** Brenda Bainbridge, Dick Baker, Colin Balchin, Ambrose Barber, Derek Barden, Peter Barker, Pamela Barnes, Frank Barrett, Geoff Barratt, Graham Bass, Ken Batstone, Dennis Baxter, Colin Bedford, Peter Bedford, Anne Beer, David Betteridge, Brian Bickers, Guy Black, John Blackmore, Melvyn Bluck, Keith Bollands, Paul Boon, Betty Bore, Pat Bott, Steve Bott, Bob Bounden, Mike Bowery, Alan Boyd, Sally Bracher, Roy Braybrook, Clive Brewer, Laurie Bridges, Doug Britton, Arthur Brocklehurst, Eric Brown, Peter Brown, Ron Bryan, Christopher Budgen, Maurice Budgen, Roy Budgen, Reg Burrell, Robin Burton, Clive Bushrod, Barry Butcher, Dave Byford. **C:** Richard Cannon, Chris Carter, Tom Casey, Bob Catterson, Colin Chandler, Keith Chapman, Keith Chard, Martin Churms, Gerry Clapp, JF Clarke, John Cockerill, Hank Cole, Percy Collino, Nigel Cook, Brian Coombes, Jonathan Cooper, Paul Cope, Patricia Cosgrove, Ron Cosgrove, Nick Cox, Mike Craddock, Shirley Craig, Richard Cripps, Russ Culley, Richard Curling, Richard Curtis. **D:** Clive Dalley, Andy Dalton, John Danse, Afandi Darlington, John Davie, Jo Davies, Ken Davies, Trevor Davies, Michael Davis, Diana Dean, Ralph Denning, Norman Devielli, Mike Diprose, Mike Dodd, Colin Dodds, Peter Dodworth, Lambert Dopping-Heppenstal, George Dow, Bill Downey, Brian Drew, Peter Drye, Dick Duffell, Jean Duffell, Gwen Duke, Chris Dunhill, Mike Dyke. **E:** John Eacott, Andy Edwards, Dave Edwards, Barry Elliot, Tony Elliott, Eric Ellis, Celia Evans, Norman Evans, Roy Evans. **F:** Russ Fairchild, Ian Falconer, Mike Fantham, Chris Farara, John Farley, John Farrow, Max Fendt, Donna Ferguson, Ian Ferguson, Stan Field, Geoff Fieldus, Mike Finlay, Wilf Firth, Richard Fletcher, Colin Flint, Ted Forster, Dave Fowler, Mike Frain, Steve Franklin, Harry Fraser-Mitchell, Geoff French, Mike French, Heinz Frick, John Friend. **G:** Roy Gaff, Mike Gane, John Gardner, Patricia Gardonio, Peter Gates, Sandie Gear, Tim Gedge, Mark Gerrard, Tony Gibbs, John Gilbert, John Glasscock, Pat Goodheart, John Gough, Chris Goymmer, Andy Green, Barry Grimsey, Ray Grout. **H:** Violet Hall, Douglas Halloway, Valerie Hanscomb, Liz Hargreaves, Simon Hargreaves, Bryan Harman, Guy Harris, Thelma Harris, Brian Harvie, David Hassard, David Hastie, Sandy Hay, Norman Hayler, Bob Head, Alan Heasman, Sheila Hemsley, Ted Henbery, Brian Hennegan, Jock Heron, Keith Hertenberg, Frederick Hewitt, Merlin Hibbs, Richard Hickey, Peter Hickman, Vince Higbee, Dennis Hills, Reg Hippolite, Keith Hobbs, Chris Hodson, Thelma Hodson, Derek Holden, Patricia Holt, Ralph Hooper, Linda Hopkins, Paul Hopkins, Mike Hoskins, Gerry Howard, Diane Howells, Terry Howes, Simon Howison, Gavin Hukin. **I:** Pete l'Anson, Len Illston, Maive Impey, David Ince, Brian Indge. **J:** Keith Jackman, Simon Jackson, John Janes, Gordon Jefferson, Mark Jennings, Harry Johnson, John Johnson, Andy Jones, Brian Jones, Ian Jordan, Robin Jowit, Alf Justin. **K:** Andrew Keech, Barry Kensett, Dennis Ketcher, Bill King, Dave King, Charles Kirk. **L:** Mike Laker, Richard Lane, George Latham, Paul Latham, Pam Lawrence, Andrew Lawson, Stanley Lawson, David Lee, Geoff Lee, Mark Lewis, Vernon Lidstone, Gary Lillistone, Andrew Lloyd, Dawn Lloyd, David Lockspeiser, Basil Lockwood-Goose, Norman Long, Terry Long, David Lovell, Lynda Lucas. **M:** David McCarter, Keith McMahan, Albert Magee, Al Mahoon, Ron Mancey, Mick Mansell, John Marsh, Ann Martin/Disspain/Turk, Brian Maton, Don McGovern, June McKeon, Mike Mendoza, Alan Merriman, Jim Middleton, Robert Millar, Alan Millican, Jack Mills, George Mitchell, John Mitton, Brian Monk, Pat Moon, Pauline Moore, Nicholas Morland, Geoff Mudle, Pete Munday, Carole Murphy, Martin Murray. **N:** Mike Newell, Anthea Newman, Jennifer Nicholas, Chris Nicholson. **O:** Roger O'Brien-Hill, John O'Sullivan, Chris Oliver, Adrian Orchard, Robin Owen. **P:** Les Palmer, Glynnie Parker, John I Parker, Bernard Patrick, John Pearce, Barry Pegram, Martin Pennell, Bill Phillips, Ted Pincombe, Dick Poole, Mat Potulski, Dave Priddy, Mike Pryce. **Q:** John Quinn. **R:** Clive Radley, Frank Rainsborough, Paul Rash, Diane Raymond, Vanessa Rayner, David Rees, Peggy Remington, Francis Rhodes, Geoff Richards, Bill Richardson, Kelvin Richardson, Chris Roberts, Graham Roe, Chris Rostant, Peter Ryans. **S:** Ian Sandell, Tim Sargant, Bernie Scott, Alex Seaman, Ray Searle, Maurice Shakespeare, Mike Sharland, Arthur Sharpe, Douglas Shorey, Duncan Simpson, Derek Sims, Gerry Sims, Siva Sivalingham, Charles Smith, John Smith, Karl Smith, Pete Smith, Thomas Sopwith, Roy Sparrow, Don Spiers, Peter Spragg, Chris Stephens, June Stephens, John Strange, Carroll Stroud, Christine Strudwick, Tony Strudwick, Douglas Stubbs, Bill Swinchatt, Edward Syredd, Laura Syredd. **T:** David Taylor, Stuart Taylor, Brian Tei, Joanna Terrell, Peter Tews, Reginald Thompson, Geoff Tomlinson, Graham Tomlinson, John Tratt, Rod Tribick, Peter Trow, Bert Turner, Michael Turvey. **U:** John Underhill. **V:** Roland Van Haefte. **W:** Terry Walker, John Wallace, David Ward, Harry Webb, Rob Welsh, Bryan West, Judith Westrop, Jan White, Mick White, Roy Whitehead, Peter Whitney, David Whittam, Annette Williams, Don Williams, John S Williams, Ron Williams, Sally Williams, Colin Wilson, George Wilson, Hilda Wilson, Paul Wilson, Dick Wise, Helen Woan, Alan Woolley, Kuo Wong, George Woods.