

NEWSLETTER 42 - Summer 2015

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EDITORIAL

As I write this 'summer edition' there is a heat wave and the sun is shining! Let's hope it stays that way for our holidays.

Did you use the membership renewal form that came with the last Newsletter? If you didn't, **please renew now**. Your names are in bold in the membership list on the back page. Also, there are still a few of you who haven't paid last year's subscription (see NL 41).

It's time to think about our annual outing, at the end of September, to RAF Northolt and the Battle of Britain Control Room moving on to the Polish Squadron Museum at Uxbridge. See the Programme below for details.

Several fascinating talks are reported in this edition, from which I hope those who couldn't come to the meetings will get a taste of how good they were. The Chairman's AGM report is also here with important comments on our future.

Please send contributions to The Editor, Chris Farara, 24 Guildown Road, Guildford, Surrey, GU2 4EN, tel 01483 825955, e-mail cjfarara@ntlworld.com.

PROGRAMME FOR 2015

Wednesday 8 th July	My Life in Aircraft Design - Mike Salisbury
Wednesday 12 th August	Social and video.
Wednesday 9 th September	Bring your 'Hawker' photographs or memorabilia.
Wednesday 30 th September	Outing to Battle of Britain Control Room and Polish Squadron Museum. Meet at RAF Northolt, 9.45 am.
Wednesday 14 th October	The Royal Navy Historic Flight - Lt Cdr Chris Goetke
Wednesday 11 th November	"Howard Pixton and the 1914 Schneider Trophy" - Philip Jarrett .
Wednesday 9 th December	Christmas Lunch.

PROGRAMME FOR 2016

Wednesday 13 th January	Social and quiz with Les Palmer .
Wednesday 10 th February	Private Aircraft in British Skies - David Hassard .
Wednesday 9 th March	Aviation Art - Graham Cooke , Guild of Aviation Artists.
Wednesday 13 th April	Annual General Meeting.

The Outing is to RAF Northolt for a tour of the Battle of Britain Control Room and to the nearby Polish Squadron Museum at Uxbridge. Members are to find their own way there (car sharing?) arriving at RAF Northolt at 9.45 am. Organiser Frank Rainsborough needs to know who is going and their car registration. Please call him on 01784 247888 for full details and to book a place.

Aerodynamicist **Mike Salisbury** was Head of Engineering at Kingston, **Chris Goetke** flies in the RN Historic Flight and **Phillip Jarrett** is a world renowned aviation historian. For 2016 you all know **Les Palmer** and **David Hassard**, and **Graham Cooke** is a well known aviation artist. Unless stated otherwise, meetings are at 'YMCA Hawker', 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.

CORRECTION

On page 3 of Newsletter 41, line 3, please change Hodson to Hudson. The Editor apologises for this typographical error

ANNUAL GENERAL MEETING - April 8th 2015

Chairman's Report - Ambrose Barber

In reviewing briefly this year's activities I believe we have again been fortunate in having been able to maintain a balanced and popular programme. We have undertaken a visit to the Imperial War Museum, regularly enjoyed each other's company and been privileged to be able to listen to yet another series of interesting speakers. Those members who missed these continue to be able to catch up with them from the excellent summaries regularly published in our Newsletter and on our Website. All this, as you have heard me say before, provides a valuable and reliable source of first-hand Hawker history which is consistent with a major aim of the Association.

Since it is some twelve years since the membership voted to adopt those six aims in their constitution it may just be helpful to remind ourselves that they are:

1. To keep alive the spirit and memories of the Hawker companies.
2. To organise social and other meetings and events for the Members.
3. To provide a means of communication between Members.
4. To publish, from time to time, a newsletter and distribute it to all Members.
5. To publicise the achievements of the Hawker companies, their people and their products.
6. To encourage and facilitate the preservation and conservation of artefacts, papers, photographs, information and data relevant to the Hawker companies, their products, achievements and people.

I feel that all who voted for these at the time could not fail to feel satisfaction at the measure of their current achievement. This has not happened by accident and I think you would wish me to record the very conscious and loyal efforts of those responsible. In this the Association has been much assisted by the on-going work of the Kingston Aviation Centenary Project and also by the Kingston Aviation Heritage Trust, whose work having now been accomplished, is anticipating honourably winding itself up.

Where, if anywhere, does the Association aim to go from here? Two years ago we amended the constitution to offer Associate Membership to those who have not been former employees but have a strong interest in our aims. So far the committee has been careful to tread gently with its recruitment but if it is desired that the Association is to attempt to have an extended existence it must ultimately rely upon enthusiastic 'outsiders'.

I leave you with this thought for the informal discussion which follows our AGM and would conclude with my thanks, and I hope yours also, for the committee members' hard work during the year.

Post AGM

During the informal discussion no reservations were voiced about the gradual extension of 'non-colleague' Associate Membership and the discussion focused on how to recruit suitable candidates.

David Hassard advocated that we each aim to bring a prospective member along as a visitor to a meeting.

Nick Stroud's generous offer to advertise, free-of-charge, the availability of Associate Membership in The Aviation Historian was welcomed.

SUMMER BARBECUE

Ken Batstone, who we thank for organising the event, reports....

On Wednesday June 10th the annual Summer barbecue was held at the YMCA Hawker Centre, our old Sports and Social Club. The weather was kind inasmuch as it didn't rain, but the sun hid behind cloud for most of the afternoon, although the temperature was high enough to allow everybody to sit outside on the patio.

The number of members and guests attending at 27 was slightly disappointing compared to last year's 34. However, the hamburgers, sausages and chicken were as good as ever and the two dessert gateaux, chocolate sponge and carrot and cream cake, were delicious. The pleasure of the event, besides the food, is the opportunity to meet and socialise with old friends in a relaxed atmosphere with more time available than at the monthly meetings. Everybody enjoyed reminiscing about the good times we all shared at Kingston and catching up on news. The afternoon was rounded off with the traditional splendid raffle (slight exaggeration) and everybody left sated and happy (particularly the raffle prize winners) by about 3.30pm thus avoiding the "school's out" rush.

AIRCRAFT NEWS

Harrier -The VAAC Harrier T4A, XW175, used by the RAE/DRA/QinetiQ for V/STOL control system development since 1983, has joined the RAF Museum collection of research and prototype aircraft at Cosford. Originally this was the second development Harrier TMk2.

Sea Harrier FRS 51- The fourteenth Indo-French naval exercise (VARUNA) started with the arrival of four French naval ships at Goa on 23rd April including the carrier Charles de Gaulle carrying Rafale M fighter aircraft. The Indian Navy participants included the carrier INS Viraat (ex HMS Hermes) with its Sea Harriers. Joint exercises included cross deck operations. Presumably this was SHARS to CdeG, not Rafales to Viraat!

Sea Harrier FRS 2 - The RN School of Flight Deck Operations at RNAS Culdrose is training 70 sailors to ensure that the UK F-35Bs are safely marshalled around the Navy's two new carriers. Fourteen 899 Squadron NAS Sea Harrier FA2s and T8s, their engines limited to preclude take off, give aircraft handlers experience of the noisy environment of a busy flight deck using a mock-up on the runway. The F-35Bs are due on board the Queen Elizabeth in 2018.

Hurricane - Hurricane MkI P3737 is at Turweston, Northants, being prepared for flight after being rebuilt by Hawker Restorations. The aircraft wreck was recovered from Russia in 1991 and has been rebuilt using wings from Canada and a Merlin from a UK crash site. It is painted in No 253 Squadron livery.

Sopwith Dove - The 80 hp le Rhone powered Dove reproduction G-EAGA, built by Skysport in the early 1990s but damaged in 2000 in a landing accident, is back at Old Warden for reassembly after repair work.

Sopwith 1 ½ Strutter - The Aircraft Preservation Society Scotland (APSS) at the National Museum of Flight, East Fortune, is nearing the end of a fourteen year project to build and fly a full scale Sopwith 1 ½ Strutter.

Thanks to contributors Bob Bounden and Max Fendt.

“EV”

Roy Braybrook remembers a much loved Hawker personality...

Evelyn Covington, who was chief librarian for Hawker Aircraft and its successors at Kingston for more decades than she would wish to admit, passed away peacefully in her sleep on March 11th. I first met “Ev” at the Canbury Park Road offices in 1954. However, the fact that she celebrated her 90th birthday last November supports my understanding that, when she joined ‘Harry’s’ straight from school at the age of 16, it was during the war, when key elements were evacuated to a stately home in Esher, Claremont. She worked initially as a tracer, before moving to the library.

Regarding her decades at Richmond Road, Ev will be remembered with affection by survivors from both the Design Department and Head Office. She had a special relationship with the Project Office. In those pre-internet times we relied heavily on Ev and her wonderful team to keep us informed of what was happening in the wider world of aviation, and especially of what the competition was doing. She was always a welcome guest at our office parties.

Ev was one of the sweetest women that I had the pleasure to meet. Like most of us, she may have been a tiny cog in Harry’s machine, but fulfilling her role in the way that she did made life not only easier but also far more pleasant for us cogs who relied so much on her support.

NEVILLE DUKE COMMEMORATED

A blue plaque has been mounted on 15, The Causeway, Horsham, where Neville and his family lived in the early 1960’s. Air Chief Marshal Sir David Cousins unveiled the plaque on June 8th in an event attended by Group Captain David Baron, chairman of the Trustees of Tangmere Military Aviation Museum where the Hawker Hunter in which Neville Duke broke the world air speed record is displayed.

P.1127 FREE-FLIGHT MODEL TESTS AT LANGLEY, 1960

Roy Braybrook recalls being embedded with NASA...

Later in life, as a journalist, I had the privilege of interviewing Harry Hillaker, “the father of the (General Dynamics, later Lockheed Martin) F-16”. As a one-time preliminary design guy in the Kingston project office, I told him GD had been incredibly brave to make the YF-16 unstable longitudinally and relying on an autostabiliser to make it flyable. Harry grinned, and explained that they had placed all the wing spars at constant pitch, so they could simply move the wing back a notch, if necessary.

We now take for granted the outstanding success of Ralph Hooper’s P.1127, but in 1959 (with first flight of the prototype due in the following year) its future was uncertain. Churchill said that “You can always count on the Americans to do the right thing – after they’ve tried everything else”, and the “trying everything else” part had certainly been true of their attempts to develop V/STOL fast jets. Hawker’s P.1127 gamble flew in the face of most US experience.

The maths said the P.1127 would take off vertically and hover, and it could obviously be made to fly conventionally. What nobody then knew was whether it could reliably be transitioned between jetborne and wingborne flight under unassisted human control by the average squadron pilot, as was the company’s aim. What was clear was that Hawker (unlike GD with the YF-16) had no simple mechanical fix if the P.1127 proved too unstable in transition.

Conventional wind tunnel tests at RAE Farnborough in late 1959 showed that the P.1127 would be highly unstable longitudinally during transition due to the jet-induced downwash gradient at the tailplane. Whether it was unacceptably unstable remained to be determined.

The only people who could find out in advance of P.1127 flight trials were in a NASA team led by Marion McKinney, using remotely-piloted powered scale models flown in the 30x60-foot open working section of the Full-Scale Tunnel (FST) at Langley, Virginia. As the tunnel airflow accelerated, the model would be transitioned from hovering to wingborne flight. Comparison with the handling of earlier US projects would give a good indication of whether the P.1127 would be flyable or not. The US role in the early development of the P.1127 has been downplayed for political reasons. The fact is that the US Air Force wanted to know if a V/STOL fast jet was feasible and was willing to fund NASA to find out, using various wind tunnel models including a one-sixth scale in the FST.

As Robin Balmer's then assistant on stability and control (later 'flight dynamics') matters, I was sent to Langley at the start of 1960 to provide liaison. I would like to write that I played a crucial role in these very useful trials, but things panned out differently. A problem arose in preparing the model for the first test. I was assured that nothing could happen for at least a week so, if I chose to attend an AGARD meeting on V/STOL in Washington DC, I wouldn't miss anything. However, unknown to me (or McKinney) an HSA director was about to visit Langley.

So, while I was in the Pentagon, listening to a Dutch presentation of a parametric study proving that V/STOL fighters were impossible, NASA director John Stack was ordering McKinney to fly the P.1127 model regardless. This explains how Kingston came to receive a telex, from that HSA director, saying the model had successfully flown through transition (on February 3rd, 1960), and where the hell was your guy Braybrook?

The FST trials were only one element of the US support provided to us in the early days of the P.1127 programme. Then chief test pilot 'Bill' Bedford later said that the training he and his deputy Hugh Merewether received on various aircraft and simulators at NASA Langley and Ames prior to flying the prototype was "a pearl of great price". I felt (and still feel) the same way about having been embedded with NASA.

RE-ENGINEERING BROOKLANDS - THE FUTURE

On February 11th Allan Winn came to Kingston to address the association on the topic of Brooklands and the future of the Museum. A New Zealander, Allan holds a BSc in mechanical engineering and amongst other positions was previously the editor of Flight International and was a committee member of the Vintage Sports Car Club for seventeen years. He also owns a 1929 3 litre Bentley. Clearly his credentials for running an aeronautical and automotive museum are impeccable and his ability has been demonstrated by his success as the Director of the Brooklands Museum since 2003.

Outlining the history of the Museum Allan pointed out that it is unique as the site doesn't just house the collections, the buildings and environs are historic in their own right. Brooklands was 'the birthplace' of circuit racing and the home of pioneering aircraft designers, experimenters, record breakers and manufacturers. In fact 18,600 aircraft of 260 types flew out of Brooklands, mostly from the Sopwith, Hawker and Vickers factories. At its peak in World War Two, which brought a halt to motor racing, 14,000 people were employed there.

The museum site extends to 32 acres containing one third of a mile of banking, the Club House and many other original buildings from the days of motor racing to later ones from the aircraft manufacturing period. Most of these have been restored or converted to house and display extensive aircraft, car and motorcycle collections and other attractions. Brooklands is the largest museum in Surrey and welcomed 177,000 paying visitors in 2014, receiving no regular funding. It is self sustaining from entry ticket sales, Brooklands Trust Member's fund raising activities, donations and sponsorship.

There is more work to do as the large aircraft are outside, the Bellman hangar leaks, the track concrete is crumbling and the archives are cramped. However £4.9 million of Heritage Lottery funding has been won for a £6.9 million project, and of the outstanding £2 million, £1.25 million has already been raised. This money will see the hangar moved off the finishing straight, restored and made weatherproof to house an exhibition using Museum assets to explain how aircraft were designed and built. Using modern 'hands-on' techniques the aim is to engage children and young people and enthuse them to take up engineering as a career.

Attached to the hangar will be a new working building to house the 'live' aircraft, which can be wheeled out for engine running or taxiing demonstrations, and for restoration work. Below will be new archive accommodation with office space for the volunteer archivists, and researchers' facilities (the Editor gives three cheers!). The cleared finishing straight and banking will be restored and the railings, score board and other motor racing features in the paddock and 'motoring village' will be recreated allowing motoring events to be staged in authentic surroundings.

Work started in May on removing 7,000 cu ft of contaminated rubble and the project is to be completed in July 2016. The next project will be to provide cover for the large aircraft park, but that is another story.

Meanwhile 'Re-engineering Brooklands' needs your support so please contribute to ensure that this hugely worthwhile effort is fully funded. Remember that Tommy Sopwith started his great industry at Brooklands and until the 1940s all Hawker aircraft were built there.

It's easy: go to <https://www.justgiving.com/reengineeringbrooklands/> where by clicking on 'donate' you can contribute as much or as little as you can afford and also see a slide-show illustrating Brooklands history and the Re-Engineering project.

SOME TEST FLYING TALES

Once again John Farley enthralled a full house of Members with stories from his test flying career, this time on March 11th. He started with "how I became a Dunsfold test pilot".

In 1963 John graduated from the Empire Test Pilots School and was posted to the Aerodynamics Flight at the Royal Aircraft Establishment (RAE), Bedford. The experimental lift-jet VTOL Short SC1, built to an RAE specification, was under test and a P.1127 was needed for comparison so John went to Dunsfold to check out the first one, XP831, which was now spare so was transferred to Bedford where John flew it. In 1966 Hawker's Chief Test Pilot (CTP), Bill Bedford was to retire so a new junior test pilot (TP) was needed. Squadron Leader Clive Rustin from the RAE Bedford Aero Flight was offered the job but Hugh Merewether and Duncan Simpson did not agree with this. John was put on the short list and invited to Hawker's board room to be interviewed by John Glasscock, Sir Harry Broadhurst and Bill Bedford. John had calculated that he would need to start at a salary of £4000 if he was to equal his projected RAF career pay; so he asked for it. The response was, "But Flt Lt Farley, we can get a Sq Ldr for £2000 - and do we need a qualified TP anyway?". So John made his case and left the room only to be called back by Bill Bedford and offered £3500 which he accepted.

At Dunsfold under the new CTP, Duncan Simpson, John got straight in to Harrier flying proving that various specification points were met. These included a maximum weight short take-off (STO) from a grass strip with bumps. The strip was checked by seeing if a Land Rover could be driven over it at 40 mph without control being lost. Nevertheless the ride in the Harrier was very rough with the air speed indicator becoming unreadable due to vibration. The climax was a loud bang with a falling sensation as the nose leg failed. John scrambled out and was looking under the aircraft when the ambulance and nurse arrived. "Mr Simpson, are you alright?" she said anxiously, followed by "Oh, it's you", and turned on her heel!

The Matra 116 68 mm rocket pods had streamlined frangible nose cones which shattered as the rockets were fired. It was necessary to prove that no damage was caused to the airframe or engine when a full load of four pods containing eighteen rockets each was fired simultaneously. A progressive approach was planned firing one pod, then two and so on building up to the full fire-out. However, due to a misbriefing on the cockpit pod selection switching, after a number of abortive attempts to fire one pod, the aircraft was seen by the chase crew to disappear in a cloud of smoke and flame as a full fire-out occurred! So, by good luck the whole programme was over in one sortie saving much time and expenditure.

At the 1968 SBAC show at Farnborough, Bill Bedford, now Marketing Manager, was approached by TPs Col Tom Miller and Lt Col Bud Baker of the US Marine Corps, wanting to fly the Harrier; just two flights each and soon! HSA quickly arranged approval with the MoD and John got the job of converting the pilots (remember, no two-seater, no simulator) so wrote a plan which started with a runway acceleration to 60 kn at which speed the throttle was to be closed. Miller agreed with this approach but Baker didn't and didn't listen to the briefing either. The Harrier was very light with a 1.3 to 1 thrust to weight ratio giving a 0 to 70 mph time of 2.4 seconds. Baker was sooooo surprised that he got to 120 kn before closing the throttle. He used his familiar F-4 technique to stop - brakes, steering and stick hard back - so the Harrier took off and rolled about before landing and coming to a halt. After that Baker was "a different bloke" and John had no more trouble with him.

In 1969 there were more American pilots in England, Bob Thomas (USN) and Bill Casey, Mike Ripley and Bill Scheuren (all USMC), for their Navy Preliminary Evaluation (NPE). They were briefed on everything HSA thought was wrong with the Harrier then flew it and reported. For them this was refreshing as in the US they deal with the "lying, cheating contractor". They got no surprises with Harrier and the sale was made. Telling the truth helps.

Group Captain Peter Williamson wanted to enter RAF Harriers in the Daily Mail Trans-Atlantic Air Race from the top of the Post Office Tower in London to the top of the Empire State Building in New York. The aircraft had only been in service a month and permission was denied. Nevertheless Williamson went ahead using A&AEE TPs, Graham Williams and Tom Lecky -Thomson. The latter was a little man with plenty to say so was known as "a small body of opinion". Tom L-T was fastest westbound with Williams second fastest eastbound to a RN Phantom. Once the race was won the authorisation arrived!

After the race Peter Williamson, Tom L-T and two Harriers were left in New York, a spare having been flown out by Andy Jones. It was proposed that two-aircraft demonstrations be given on the east coast to support the Harrier sales effort. John flew out to NY, met Tom L-T and devised a plan. At Andrews Air Force Base near Washington DC they flew for five days, John doing the V/STOL and Tom the high speed demos. The ground crew were RAF VC-10 men. There were no unservicabilities and no trouble. Afterwards, landing at Naval Air Station Norfolk (Virginia) the two pilots were met by Bob Thomas (NPE) and discussed a plan. John wanted to fly from a road to the USS LaSalle which, moored in the adjacent bay, had a helicopter deck suitable for a Harrier VTOL. Peter Williamson supported the idea so Bill Bedford and Barry Laight (Chief Engineer at Kingston) were consulted. Bill was against the idea and got Laight to forbid the operation. However, the aircraft were Williamson's so the demo was flown, successfully with no problems. The Americans were impressed especially when Williamson announced that John had "never been near a ship before in his life".

John then told a few Marine Corps stories. During the 1971 Harrier BIS (Board of Inspection & Survey) at Patuxent River John noticed a large irate senior Marine Sergeant in the cockpit having trouble putting the five different size and shape servicing pins in their unlabelled stowage. Strolling over to help John explained that it was an intelligence test and if the Sergeant couldn't do it he should not be in the cockpit. John narrowly escaped being assaulted!

At an informal dinner for Pax test people John was encouraged to speak about flying the Harrier. He explained that it was much easier to hover than a helicopter, so much so that he once fell asleep during a prolonged performance hover. He dreamed that brain transplants were easily available at prices from a few dollars for a well used example to thousands of dollars. It was explained that the expensive one came from a helicopter designer and it had never been used. The joke was initially received in silence. Later John found out that the guest of honour was Frank Piasecki, the renowned helicopter pioneer!

At the next Farnborough Show John was leaving the bar in the HSA chalet carrying a couple of large G&Ts for some guests when he met a USMC officer. John explained that he couldn't stop to chat just then because as soon as he had got rid of the two drinks he had to fly his demo. Afterwards he met the officer again who said he could see why the gins were needed. John of course thought he was joking. On his next visit to the USMC, at Cherry Point, there was a message at the gate for him to go to the base Commander's office. "I understand you drink before flying a display", said the Colonel and stated that John was not fit to visit his pilots. John assumed it was a leg-pull and reacted accordingly which proved to be a mistake.

John went on to tell a few more stories including flying the MiG 29 and demonstrating G-VTOL to a Chinese MiG pilot who not only couldn't speak English but could only understand Chinese characters. Space precludes covering them but if you want to know more read John's book, 'A View from the Hover - My Life in Aviation' which the editor thinks is one of the most informative and entertaining aviation books he has ever read. For £27 (including £4.50 postage) John will send you a signed copy. Contact him on 01234 670772 or johnfarley@skerries1.co.uk. (Publisher's, price is £29.99, Seager Publishing).

FROM THE FIRST LOOP TO THE RED ARROWS

On May 13th Members got a taste of what it is like to go on a cruise as Chris Roberts gave a talk based on one he gives to fare paying cruise passengers. It was, of course, professionally presented in Chris's inimitable and entertaining style with excellent 'Powerpoint' slides.

Chris started with some brief historical background beginning with Leonardo's flawed designs for flying machines and the Wright brothers who successfully flew their light, stiff, airframe in December 1903. Ten years later Pyotr Nesterov accomplished the first loop near Kiev in a Nieuport IV monoplane. He was jailed for risking government property but was released, promoted and decorated. In August 1914 Pyotr destroyed an enemy aircraft in flight, for the first time, by ramming; he fell out and was killed.

The first RAF Aerial Pageant was in July 1920 where RAF Central Flying School (CFS) Sopwith Snipes performed. By 1934 the Aerial Pageants had become Empire Air Days and Gloster Gauntlets were performing aerobatics tied together. There were sixty Empire Air Days in 1939 but the war intervened until 1947 when the jet age had started with 54 Squadron Vampires as pioneers. In 1952 there were 38 RAF teams: 15 with Meteors, 20 with Vampires, 2 with Chipmunks and 1 with Prentices.

1957 brought 111 Squadron's 'Black Arrows' Hunters with their 22 aircraft loop. In 1961 92 Squadron's 'Blue Diamonds' took over, also with Hunters. The Lightning F1 came on the scene with 74 Squadron's 'Tigers'. This led to large turning circles which was not a good display of skill but the Lightning's fire and noise was impressive. In 1964 the CFS team Jet Provosts, the Red Pelicans, (the Pelican is CFS emblem) showed plenty of skill but not much spectacle.

When the Folland Gnat came on the scene formation aerobatics in it were banned by the A&AEE. However, Lee Jones, ex 111 Squadron, set up an illegal photographic session with loops for a Bristol Engines photographer. Jones, who had the ear of the Air Marshals, showed them the photos and soon a local team of five Gnats, the Yellow Jacks, led by Jones, was flying at RAF Valley. At the 1964 Farnborough show both the Yellow Jacks and the Red Pelicans performed. Next year the Red Arrows Gnat team was formed as the first professional full-time RAF aerobatic team. The primary purpose of the Red Arrows was to be recruiting. In 2014 the 50th season was celebrated and 2015 was the 36th anniversary of the introduction of the Hawk.

Turning to his own career Chris said that in 1965, at 19, he became a qualified jet pilot and moved on to fly Hunters. He volunteered to become a CFS instructor and in 1971 joined the Red Arrows, a year marked by a mid-air collision which killed four pilots who were buried at Little Rissington. There have been nine fatalities in the history of the Red Arrows. The remaining seven Gnats completed the season but for 1972 there were once again nine aircraft in the team for a tour of USA and Canada; 'Exercise Longbow'. The northern crossing would be made from Kemble to Washington DC via Stornoway, Keflavik, Frobisher, Baffin and Goose Bay.

The Gnat was very small and carried little fuel so the slipper tanks were fitted and, because the magnetic compass would be unreliable in northern latitudes, a Vulcan would accompany the Gnats for navigation. As range was limited a second Vulcan flew ahead to report on weather conditions to be sure that the head winds were not too strong. A Hercules carried the support crews and starters for the Gnats. The USAF would provide search and rescue services using the CIA 'skyhook' system where a Hercules would hook a wire suspended from a balloon attached to the downed pilot in his dinghy and drag him up to safety! This was necessary because a quick rescue was essential as sea temperatures would be very low.

Turning to the techniques of formation aerobatics Chris said it was primarily a station keeping task where most pilots formed on the leader, not his neighbour. This is not an easy task, whilst also checking his position left-right, fore-aft, up-down etc. It is a bit easier with smoke operating as that gives 'tramlines' in the sky. Perspective affects the view of the formation as seen by public on the ground so the formation has to be adjusted to maintain the correct appearance of, say, a diamond. Displays are filmed for later analysis to see who was out of position so corrections can be made. Aircraft on the outside of the formation suffer from the yaw effect due to ailerons, known as 'dishing', making it necessary to fly with crossed controls. Precise and careful planning is necessary with a display datum established in relation to the prevailing wind; W-E in the UK. The trickiest and most risky part of a display is rejoining where eight aircraft have to home on the leader after, say, a 'bomb-burst'. Each pilot must carefully fly his own profile as he may be blind to other aircraft also homing on the leader.

Chris opted out after two seasons partly because he was having trouble concentrating due to the fact that he had got too used to formation aerobatics and his mind tended to wander.

The basic principle of formation aerobatics are, said Chris:

1. Impress the professionals.
2. Entertain the public.
3. Frighten nobody.

BOOK REVIEWS

BAE Systems Harrier II - the Harrier GR9 and T12 in the 21st Century.

The authors, Andy Donovan and Nick Greenall, have done a magnificent job in assembling this 225 page collection of some 900 colour photographs of the UK Harrier II with 15 pages of introductory text. No detail visible from the outside of the aircraft, in the cockpit, in the equipment bays or behind access panels is left unrecorded in close up detail. The volume is beautifully produced by DoubleUgly! Books at £39.99 and really deserves a hard cover but I suppose the cost would price the book beyond the reach of its target market - enthusiasts and modellers.

The first 15 pages succinctly cover the development of the Harrier family, the many Harrier II upgrade programmes from GR5 to GR9, the Pegasus, and in more detail, the service history. There are a few technical errors. Wibault's concept did not use a Bristol Orpheus with four 'blower' nozzles, but a Bristol Orion turboprop driving four rotatable centrifugal compressors. The writers also suggest that Camm had a hand in the initial design of the P.1127 whereas it was purely Ralph Hooper's concept.

However, the book performs its main task admirably and can be recommended to anyone interested in the minutiae of the aircraft, its upgrades, its weapons and its service use. The text is in English and German and any 'Kingston' man reading it will feel justifiably proud of this supremely capable ground attack and reconnaissance fighter.

The book can be obtained from The Aviation Book Shop: (01892 539284, e-mail:

info@aviation-bookshop.com, website: www.aviation-bookshop.com)

Hawker Siddeley Aviation and Dynamics, 1960-77

With this excellent book Stephen Skinner has filled a gap in the history of Hawker Siddeley by concentrating on the companies rather than their products. However, the latter are covered but in the context of the history of the programmes and their value to the companies. For this he is to be applauded as technical details can be found elsewhere. Of particular interest to Members will be the Dynamics coverage which is little known to us. Excellently produced by the Crowood Press (ISBN 978 1 84797 739 7) and priced at £29.95 by Amazon, this book is good value and highly recommended. There are a very few minor errors in the aircraft chapters.

'Aeroplane' Icons - Hawker Harrier, Warfare with Vertical Velocity.

Recently issued by Key Publishing, this 'bookzine' is an historical survey of the Harrier from P.1127 to Harrier T12. It is very well illustrated but the text contains quite a few technical and historical errors which it may amuse members to spot (I found 34, Ed.). There are 1/72nd scale GAs of the main Mk's of Harrier and a useful summary of all variants with engine models. You can buy it at Smiths for £7.95.

MEMBERSHIP NEWS

Sadly we report the deaths of Maurice Budgen, George Dow, Sandy Hay, Thelma Hodson (widow of KGH) and John Underhill and send sympathy and condolences to their families and friends.

We welcome new Members Lyn Baker, David Cotton, Robert Richardson and Graham Weller.

MEMBERSHIP LIST - JUNE 2015

Members who have not yet paid their subscriptions for 2015 - 2016 are in bold below. Please send cheques payable to The Hawker Association to Barry Pegram, 12 Becket Wood, Newdigate, Surrey, RH5 5AQ. If you are **leaving** please let him know by post or by telephone on 01306 631125. Thank you.

A: Roy Adolphus, 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, Lyn Baker, Colin Balchin, Ambrose Barber, Derek Barden, Peter Barker, Frank Barrett, Geoff Barratt, Graham Bass, Donald Bateman, Ken Batstone, **Dennis Baxter**, Colin Bedford, Peter Bedford, Anne Beer, **David Betteridge**, Brian Bickers, Guy Black, John Blackmore, **Andy Bloomfield, Melvyn Bluck, Keith Bollands**, Paul Boon, Betty Bore, Pat Bott, Steve Bott, Bob Bounden, Mike Bowery, Alan Boyd, Sally Bracher, Roy Braybrook, Laurie Bridges, Doug Britton, Arthur Brocklehurst, Eric Brown, Peter Brown, Ron Bryan, **Christopher 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, John Chitty, **Martin Churms**, Gerry Clapp, JF Clarke, John Cockerill, **Hank Cole**, Percy Collino, **Nigel Cook**, Brian Coombes, Jonathan Cooper, **Patricia Cosgrove, Ron Cosgrove**, David Cotton, Nick Cox, Mike Craddock, Shirley Craig, Richard Cripps, **Jane Cull** (nee Nightingale), 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, Wilfred Dimsdale, Mike Diprose, **Colin Dodds**, Lambert Dopping-Heppenstal, Cliff Douthwaite, Bill Downey, Brian Drew, **Peter Drye**, Gwen Duke, **Chris Dunhill**, Mike Dyke. **E:** John Eacott, Andy Edwards, **Dave Edwards, Barry Elliot, Stephen Elliott, 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, 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Jennifer Nicholas, **Chris Nicholson**. **O:** **Roger O'Brien-Hill, John O'Sullivan**, Chris Oliver, Adrian Orchard, Robin Owen. **P:** Les Palmer, **Glynnie Parker**, John Parker, Bernard Patrick, John Pearce, Barry Pegram, Martin Pennell, Bill Phillips, Dick Poole, **Mat Potulski**, Phillip Pratt, Dave Priddy, **Mike Pryce**. **Q:** John Quinn. **R:** Clive Radley, Frank Rainsborough, Paul Rash, Diane Raymond, Vanessa Rayner, **David Rees**, Peggy Remington, **Brian Renwick**, Francis Rhodes, Geoff Richards, Bill Richardson, Robert Richardson, Chris Roberts, **Alistair Robertson**, Chris Rostant, Peter Ryans. **S:** **Ian Sandell**, Tim Sargent, Bernie Scott, Alex Seaman, Ray Searle, Maurice Shakespeare, Mike Sharland, 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, Mary Stark, Chris Stephens, June Stephens, John Strange, Carroll Stroud, Nick Stroud, Christine Strudwick, Tony Strudwick, **John Sweetman**, Bill Swinchatt, Edward Syradd, Laura Syradd. **T:** **Dominic Tait**, David Taylor, Stuart Taylor, Brian Tei, Joanna Terrell, Reginald Thompson, Geoff Tomlinson, Graham Tomlinson, **Richard Townsend**, John Tratt, **Rod Tribick**, Bert Turner, **Michael Turvey**. **V:** **Roland Van Haeften**. **W:** Terry Walker, **John Wallace, David Ward, Harry Webb**, Graham Weller, Rob Welsh, Judith Westrop, Jan White, Mick White, Roy Whitehead, Peter Whitney, David Whittam, Annette Williams, Don Williams, John S Williams, Sally Williams, Geoff Wilshire, Colin Wilson, George Wilson, Paul Wilson, Dick Wise, Helen Woan, Kuo Wong, **George Woods**, Alan Woolley.