

## Notes on Lecture to Loughborough RAeS Branch 24<sup>th</sup> April 2012

### Some Memories of a Flight Test Career

By David Eagles

Notes by Frank Chambers

On the 24<sup>th</sup> April 2012 David Eagles, former Chief test Pilot and Director of Flight Operations at BAE Systems, presented an excellent lecture entitled “Some Memories of a Flight Test Career”.

David started his career in the Fleet Air Arm, having been enticed into national service with the Royal Navy (RN) by an advertisement in the Radio Times “depicting a pilot wearing a sheepskin jacket walking down a sloping flight deck”! He also reflected that he felt lucky to have been starting out in the 1960’s when there seemed to be a wider choice in both career path and aircraft being produced by the British aircraft industry compared with today.

After six months induction training on HMS Indefatigable at Lee-on-Solent, which involved a lot of drills and square bashing without sight of an aircraft, David was posted to Pensacola Florida, to undertake flying training under the Mutual Defence Aid programme. Starting on North American Harvard/Texan trainers, the US based flight training course was a highly structured one, each pilot undertaking nineteen 1½ hour flights before going solo. The course then progressed through gunnery/weapons (bombing) training and simulated deck landings at a satellite field before proceeding on to the USS Monterey for 3 weeks training on the real thing!



A picture of David Eagles first deck landing aboard USS Monterey

After completion of deck landing training, David progressed to instrument flying training on the T28 before graduating to jets first flying the Lockheed TB2 trainer version of the F80 and then the Grumman F9F2 Panther for advanced jet training. The Panthers crisp handling characteristics and 360° per second roll rate capability due to it’s powered aileron control left a lasting impression on David and his fellow student pilots.

David completed his flying training in the UK, firstly on the Vampire ( a good but sedate aircraft compared with the Panther) and then with the Sea Hawk, concentrating primarily on instrument flying training. Luckily, this part of his course coincided with the RN introduction

of the mirror controlled approach system and angled flight deck systems which helped to significantly reduce flight casualty rates within the Fleet Air Arm.

Completion of flight training was followed by a secondment to the Royal Australian Navy where, hoping to be flying DH Venoms, he was somewhat disappointed to be assigned to a Fairey Firefly squadron. A casual request to get Venom experience was greeted with a curt "just get on with it!" response from his commanding officer.



David in front of his Royal Australian Navy Firefly

Flying the Firefly resulted in David's first accident, a mid-air collision costing him about 6ft of wing and the need to ditch the aircraft in Jarvis Bay! From the Firefly David was transferred to a Hawker Sea Fury squadron: this was an aircraft that he found to be an absolute delight and a particularly good aerobatic mount. It was now around the time of the Suez crisis and David was faced with a choice; either go back to the RN or take up a recently offered full commission with the Royal Australian Navy. The prospect of active service with the Fleet Air Arm proved to be an opportunity that he could not resist so he made the decision to return to the UK for a tour of duty on the recently re-fitted HMS Victorious, finally getting his first tour on Sea Venoms.



A brace of FAA DH Sea Venom's

The primary role of Victorious' two-seat Sea Venoms was that of air interception which meant that the pilot had to develop a good rapport with his navigator who was responsible for vectoring the pilot on to potentially hostile aircraft using the Sea Venom's Airborne radar system. His tour on the Sea Venom was a happy one during which time his squadron sustained no losses. David found this aircraft delightfully easy to fly and land on a carrier, day or night, especially when compared to the Scimitar and Sea Vixen that followed it.

David had two tours on the Sea Vixen during which he was a member of a 5-ship aerobatic team, but, in his assessment, "the Sea Vixen was not an ideal aircraft for aerobatics", being much heavier than the original DH110 prototype and a rather heavy handling aircraft. Two hands on the stick was not an unusual occurrence when flying the Sea Vixen.

At this point in his career, David was posted to the Empire Test Pilot School (ETPS). Here he was able to acquaint himself with a range of RAF aircraft that were all new to him as an RN pilot.



The range of aircraft types on charge with the ETPS during the 60's

All the ETPS aircraft were used to train the student in test pilot procedures, eg cockpit evaluation. David's main recollections of his time at ETPS are hard work and a general feeling of anxiousness about making the grade. There were pilots of 8 nationalities on his course, and the workload and social life were heavy. Part of the syllabus was inverted spinning training in a dual control Hunter, and one pilot on the course, future US Skylab Astronaut Bill Poag, found this a particularly memorable experience.

After the ETPS course it was on to Boscombe Down for evaluation of new military aircraft. Although there was no formal naval section at Boscombe, he joined a group tasked with evaluating new naval aircraft, which included the Sea Vixen, Sea Balliol, Gannet and Buccaneer, but his main responsibility was as project pilot for the Blackburn Buccaneer II.

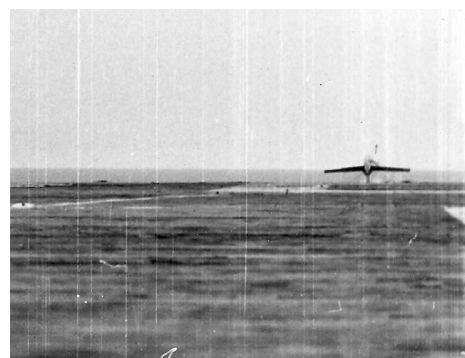
Slow speed control on carrier approach was a particular challenge in the Buccaneer II program. Designed as a low level strike aircraft, the Buccaneer was designed with a high

wing loading in order to minimise gust response at low level. In order to achieve satisfactory low speed handling for landing the Buccaneer wing incorporated a boundary layer blown wing fed from the engines at low speed. Replacement of the Gyron Junior engine with the more powerful Spey gave rise to inefficient control of the boundary layer airflow over the wing, a problem that could result in an increase in landing speed to 160Kts from 130Kts. This characteristic necessitated deployment of an open airbrake on approach to ensure that a higher throttle setting on approach could generate adequate boundary layer control.



First deck landing trials of the Blackburn Buccaneer II on board HMS Ark Royal – note deployed airbrake

By happy coincidence, Buccaneer II hot trials were to be conducted off the coast of Florida from USS Lexington, and this meant a return to NAS Pensacola, where David assured us that all the pubs were the same as he remembered them. During these trials, minimum launch speed was determined by finding the lowest speed at which the aircraft sink off the end of the carrier was no greater than 10ft, a risky and attention getting process!



Determination of minimum launch speed for the Buccaneer II was an attention getting process!

On leaving Boscombe Down, David had ambitions to leave the RN to take on a test pilot role at Blackburn. However, the RN kept him on for a further 2 years as an air warfare instructor

due to the recent loss of some key personnel. Whilst serving in this role with an operational squadron he was asked to participate in a 5-plane Buccaneer display team, which he found rather frustrating given his ambition to leave the service and carry on test flying for the aircraft industry. Finally in 1968 David was able to leave the RN and join the British Aircraft Corporation where he worked with the Strikemaster, and then the Lightning, developing bomb sight setting systems for the Royal Saudi Arabian Air Force machines. He was also involved in ferrying aircraft to the Saudi Arabia which involved 6½ hour direct flights with 3 air refuelling stages.



A Lightning F Mk. 53 of the Royal Saudi Arabian Airforce

Later he also worked on Canberras, flying re-assembled aircraft out to export customers in South America. A variety of flight paths across the Atlantic were used depending on the time of year and weather conditions; this, combined with the flying characteristics of the Canberra (low wing loading, smooth handling and high ceiling) made for many memorable experiences, especially when turbulent air around the equator gave rise to some quite bumpy flying conditions, not to mention having to pay for fuel with cash!

1969 saw the start of Jaguar test flying. BAC's then Chief Test pilot Jimmy Dell spent a lot of time in France flying the Jaguar, although whether he achieved the agreed 50:50 share of flying in partnership with the French test pilot Bernard Witt was open to debate. The Jaguar had many interesting features such as a first generation integrated navigation and weapons system and non-linear pitch gearing to accommodate Jaguar's large load carrying capabilities. In addition to Jaguar David spent some time flying the first two Rolls Royce Spey engined Phantom F-4Ks.

The TSR-2 debacle, prompted the UK government to enter multi-national projects for development of new strike and fighter aircraft for the armed services. The first project of its kind being MRCA, or Multi-role Combat Aircraft (which ultimately led to the Tornado). David signed on to this programme, as project pilot, before the first prototypes were built, and the UK was responsible for design and build of the front and rear fuselage sections of the aircraft. This meant that he spent a lot of time developing the cockpit layout, particularly the throttle quadrant arrangement which needed to toggle between dry, re-heat and thrust reverser control. MRCA first flew in 1974 (from Munich) and, as you might expect with a multi-national project of this sort, the arrangements for the first flight were subject to all kinds of political maneuvering about when, where and who would make it.

Once the flight test programme started Panavia were paid using a scale of performance check milestones. Given that the early versions of the RB.199 engine were somewhat down on power compared to their intended design specification, a degree of interpretation was applied to the performance milestone rules when it came to proving performance milestones had been satisfied. David also commented that his favorite photograph from the programme was taken by Alan Love from a Lightning chase plane while he was holding the control column between his knees!



MRCA (Tornado) prototype P.02 taken from the Lightning chase plane by Alan Love

The programme progressed through various stages of development including flight re-fuelling and proving the terrain following radar at 200 ft. at night. David also highlighted that the programme made extensive use of real time telemetry to monitor aircraft performance, and this led to a very efficient and rapid completion of the flight test programme for MRCA/Tornado. David also commented on the Tornado Air Defence Variant (ADV) ordered by the RAF. This variant incorporated an extra section of fuselage to accommodate the Skyflash air-to-air missiles and more fuel plus a more streamlined nose section which resulted in improved acceleration through to Mach 2 compared with the strike variant of Tornado.

By the end of the early eighties the run down in the Tornado development programme led to BAe and the other consortium companies to consider new development projects to follow Tornado. BAe produced a number of design options for new fighter, as did their German and Italian peers, and so naturally the prospect of re-forming a European consortium to produce the next generation fighter for Europe was explored by the members of Panavia. The intention was to build a high performance technology demonstrator to show the European defence ministries what they could achieve. Christened EAP for Experimental Aircraft Programme, the original intention was for the consortium to build three demonstrator aircraft, but this was subsequently reduced to one after the defence ministries of Germany and Italy pulled out leaving the consortium companies to fund the project, with the help of the UK Government. Funding was tight and much of the equipment was provided by sub-contractors free of charge on the understanding that they would be favourably considered if a future production programme came about.

The aircraft was to feature new materials, e.g. carbon fibre wing structures, electronic cockpit and a quadruplex fly-by-wire system designed to control an unstable aeroplane thus saving weight and wetted area. The progress on the project was swift with the demonstrator being rolled out at Warton during 1986. David spent some time discussing EAP's complex instrumentation suite, pointing out that he had insisted that conventional instrumentation was included in case of a system failure. His stand was vindicated when on one occasion Chief Project Pilot Chris Yeo suffered a complete system failure when flying EAP back from Farnborough. Subsequently, much of the EAP cockpit instrumentation was simplified in the production version of the Typhoon.



EAP taking off on its maiden flight August 1986

The EAP project was a great success with the aeroplane going supersonic on its first flight in August 1986 and probably did much to promote the feasibility of the subsequent Typhoon project.

David concluded with a couple of photos of one-off flights in Rolls Royce's Spitfire which was arranged as a payback for some favours he had done for RR during the Spey Phantom project, and an English Electric Wren powered by a 9hp engine, a microlight of its day that, considering its lack of power needed quite a lot of runway to get airborne.

In conclusion, David gave the Loughborough Branch of the RAeS a very informative and entertaining lecture on his varied and successful career as a test pilot and with the Fleet Air Arm. He also gave us a useful insight into the complexities of test flying and the challenges presented by aircraft design and development within the framework of an international consortium.