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Keeping the Battle of Britain Memorial Flight Airworthy

by Warrant Officer Kev Ball, RAF BBMF, and Richard Oldfield, BAE Systems

1. The History, Aircraft, Personnel and Operation of the BBMF – WO Kev Ball

The BBMF plays a major role in enabling us to remember the past. It also serves to promote the modern day RAF and to enthuse new recruits to join the RAF.



Some of the BBMF Aircraft

The BBMF has its origins in 1957 when a Wing Commander Thompson had the idea for developing an historic flight. By 1963 a flight had been established at RAF Coltishall and comprised a Hurricane Mk IIC LF363 and a Spitfire PR XIX PM631. The flight was moved to RAF Coningsby and, by the early 1970's, included a Lancaster B1 PA474. The flight now comprises 2 Hurricanes, 6 Spitfires, 1 Lancaster, 2 Chipmunks and 1 Dakota. Four different types of engine are used in these aircraft but, each type includes a number of variants.

Hurricane Mk IIC LF363 was built in Castle Bromwich in 1944 and is believed to be the last Hurricane to enter service with the RAF. Hurricane Mk IIC PZ865 is the last Hurricane ever built.

Another BBMF aircraft, a Spitfire Mk IIa P7350, is the oldest airworthy Spitfire and is the only Spitfire still flying which actually fought in the Battle of Britain. Yet another Spitfire, a Mk Vb AB910, flew a remarkable 143 combat sorties in almost 3 years of wartime operations. Spitfire Mk LF XVI TE311 is a low-back/bubble canopy version of the Mk XVI with "clipped" wingtips. This aircraft has just been restored. The two PR XIX Spitfires are both fitted with the more powerful Griffon engines and incorporate large wing fuel tanks in place of guns. Both PR XIXs were built just too late to see WWII service.

Lancaster B1 PA474 is one of only two Lancasters to remain in airworthy condition; the other is in Canada. It was completed in late 1945, just after the end of WWII. Currently it bears the markings of Lancaster EE139, "Phantom of the Ruhr", which flew a total of 121 operations during WWII.

The C-47 Dakota was manufactured in the USA in 1942 and obtained by the BBMF in 1992. It is now painted to represent Dakota FZ692 around the D-Day period in 1944. It is fully para-drop capable and has been used in this role for special commemorative events.

The two Chipmunks were not described in the lecture.

Manpower is a big issue with the BBMF as Specially Qualified and Experienced Personnel (SQEP) are needed to maintain its aircraft. The aircraft may be simple compared with present day aircraft, but they require different skills to maintain them. This necessitates a constant training programme as experienced staff move to other RAF posts and are replaced by new staff. Currently the BBMF has 35 personnel and is based at RAF Coningsby.

The BBMF Year is divided into two parts; Winter (October – March) and Summer (April – September). During the Winter only the Chipmunks are flown. This is also the time when all of the in-depth maintenance takes place.

Anyone can bid for a BBMF display; typically there are 3,000 bids submitted each year leading to 1,000 appearances over the Summer months. Of these there are 5 flypasts for each full display. There is a Visitor Centre at RAF Coningsby.

2. Lancaster Fatigue Management – Richard Oldfield, BAE Systems

The four engined Avro Lancaster was a development of the two engine Manchester. 7,377 Lancasters were built and, like the Manchester, it was designed for mass production using a metal stressed skin method of construction.

Lancaster BI PA474 was built in May 1945 at Broughton, Nr. Chester. In the past it has been used in photo-reconnaissance and flight refuelling roles. It was also used at Cranfield for laminar flow trials. This knowledge of its history was crucial in predicting the residual fatigue life of the aircraft. As a result, the 1983 Fatigue Index (FI) of life used was calculated as being 70.3/100. The FI actually relates to the rear spar bottom boom but may be translated to any other location. Additional fatigue life calculations were based on information derived from equivalent parts used on Shackleton aircraft.

A 54 minutes flight profile has been assumed for the purpose of present day fatigue life assessments and regular reviews are held to ensure that the actual flight profiles do not compromise this profile.

A Mk 18 G Meter, fitted over wing in the centre of the fuselage, is used to provide a record of the vertical G loads experienced during each flight.

Regular Non-Destructive Testing (NDT) is carried out on the aircraft. This involves removing selected bolts, for example in the wing spars, and closely inspecting the holes from which the bolts have been removed.

The lecture was attended by 210 people.

Joint lecture with the Loughborough (University) Alumni

Notes written by Colin Moss, RAeS Loughborough Branch