



New Forest Aviation Group.

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2014 TALKS

10th October 'The Ordnance Survey Flying Unit' by Paul Marshall
14th November 'Palmer – Bournemouth Airline' by Mike Phipp
December – No meeting

2015 TALKS

9th January 'Britain's Last Airliner – the BAe 146' by Steve Robson
13th February 'London's Second Airport – Blackbushe' by Dave Ruffle



Our September talk was by Graham Tomlinson who, as a BAe test pilot, had flown the Lightning II, or F35B. The aircraft was required due to the phasing out of a number of combat aircraft during the coming years such as F16, A10, F117, F18 and the US AV8B, (the USA Harrier). In the UK the Tornado, Jaguar and Harrier needed to be replaced and Australia's F111s were long in the tooth. Budget pressure and the situation of ageing, but differing role, fleets drove the need for commonality but also variants of a common design. Two consortia competed for the project with the Boeing X32 against the Lockheed Martin X35 in the Joint Strike Fighter program, which Lockheed Martin won. Fellow consortium members were Northrop Grumman and BAe. The F35A is a conventional take off and landing aircraft, the F35B is a short take off and vertical landing (STOVL) and the 35C is a carrier-based version. The potential order was enormous – a total of 3000 aircraft of which the USA would want 2400 and rest of the world 600. The UK is a Level 1 partner having contributed approximately 10% of the development costs and in return, through BAe and Roll-Royce primarily, will receive approximately 13% of sales value worth over £1bn to UK industry each year and supporting around 25,000 British jobs over the next 25 years. The UK has 3 aircraft currently at Eglin for test, evaluation and training.

For the pilot his interface with the aircraft is a step change in concept and capability. The HUD is displayed inside his visor and the helmet uses reference sensors to know where the plot is looking and so displays the HUD as if it were fixed in the aircraft. Meanwhile the pilot can look anywhere, even down, and obtain an electro optical view of the world around him.

To achieve STOVL capability the aircraft uses a lift fan (made by Rolls-Royce) driven from the engine and clutched in as required for vertical flight. This is the fruition of the ideal concept that enables 100% engine thrust to be used for supersonic forward flight yet also achieves vertical flight. So the 40,000 pounds of thrust is divided during transition for 20000 lift, 16000 core and 4000 roll control. The core thrust can be guided down by an ingenious rotating nozzle design. This balancing act relies entirely on computer control which is integrated to the extent that to take off the pilot merely presses a button. Should the shaft or fan fail the resultant pitch down is so rapid that the pilot will not have time to react and therefore an auto eject system is used which detects such a failure. The Harrier required a juggling act between throttle, nozzle position and joystick which could result in departing at low level – all this is now under the control of a throttle to go faster or slower (or backwards) and a side-stick with roll and down or up control – the computers then work out what the aircraft needs to do. Graham had experience from the QinetiQ Vectored-thrust Aircraft Advanced Control (VAAC) Harrier at Bedford where he let the aircraft land itself using a computer sitting in the back seat. Ship operations are hazardous at the best of times and a system of lights (Bedford Lights) has been developed that maintains a steady point for the pilot to aim at. This combination simplifies the whole operation of landing onto a pitching and rolling deck.

Airframe design is high stealth using different materials and great attention is paid to fuselage and wing shape as well as door apertures, which can give large reflections. The two enclosed weapons bays can each carry a bomb and an air launched missile. Whilst there are hard points for more ordnance, the drag and stealth characteristics suffer dramatically. This impressive talk was well illustrated with Graham using excellent graphics to show all the salient points.