

BAe EAP ZF534

MUSEUM ACCESSION NUMBER X005-5992

Built by British Aerospace as the sole example of the Experimental Aircraft Programme technology demonstrator, as part of the development of a new agile air superiority fighter, which eventually appeared as the Eurofighter Typhoon, (which first flew as the European Fighter aircraft (EFA) in March 1994).

- 26 May 83 British Government signed contract with BAe for EAP development, jointly funded by the MoD and industry including MBB of Germany and Aeritalia, the single airframe being intended to research technologies associated with advanced fighter development, incorporating a fly-by-wire system evaluated on Jaguar test bed XX765, and the concept of the delta wing with canards. The airframe was built by BAe using an adapted Tornado rear fuselage and fin/rudder and one Italian built wing.
- 27 Oct 85 Partly completed EAP towed out of assembly hall at Warton for weighing and ground tests including fuel system calibration. Photo- Aerofax Eurofighter 2000 p.9.
- 16 Apr 86 Officially rolled-out at Warton. Photo – Eurofighter Typhoon (Harkins) p.19. Unveiled by Sir Raymond Lygo, Chief Executive of BAe. Photo – Test Flying in Lancashire Vol 2 (Longworth) p.286.
- Jun 86 Ground engine runs underway.
- 1 Aug 86 Taxi and fast taxi runs commenced.
- 8 Aug 86 Following delays due to poor weather, made its first flight, taking off at 15.47hrs; pilot was Tornado test pilot David (Dave) Eagles (BAe's Executive Director of Flight Operations), reaching Mach 1.1 at 9,144m/30,000ft in a 67 minute flight. Photos – Aircraft Illustrated February 1999 p.25 and Longworth vol. 2 p.289-290.
- 10 Aug 86 Second flight – pilot Chris Yeo.
- 12 Aug 86 Flight 5 – pilot Pete Orme.
- Sep 86 Photo charter with some experiments planned just before Farnborough. On performing a 1g to 4g 'rollercoaster' Test Pilot Chris Yeo loses all computer screens in the cockpit. Aircraft returned to Warton on the back-up instruments provided. Fault found to be a 10 millisecond power interruption to the computers as oil moved resulting in computer

lockdown. Aircraft modified to prevent repeat occurrences when back at Warton.

- Sep 86 Shown at the SBAC Farnborough Airshow, Hampshire on its 21st flight. Photos – Aircraft Magazine February 2011 p.7 and January 2012 p.38; Aerofax Eurofighter p.10; Great Aviation Collections of Britain (Ellis) p.199; Aeroplane Monthly July 2018 p.65.
- The initial flight-test programme was funded by BAe and lasted for three and a half months, covering 50 flights, after which the flight testing was funded by the UK MoD. The aircraft had attained a maximum speed of Mach 2.0 and an angle-of-attack of 33-degrees. As well as being used for flight testing technologies for the Eurofighter, the aircraft conducted ground tests including electromagnetic compatibility tests, validation of flight-control system and avionics and radar signature investigations at the BAe Warton radar cross section range. The EAP investigated or proved some 36 technological developments for the forthcoming EFA project.
- 22 Oct 86 Handling and Emergency Power Unit trials commenced in preparation for high angle of attack trials.
- 21 Nov86 Laid up in preparation for high angle of attack trials. Longitudinal instability modified from 12% to 15% mean chord and an anti-spin gantry was fitted to the rear of the aircraft. Control laws also upgraded to ‘Paris Standard’ with AoA and sideslip feedback.
- May 87 Main phase of research flying commenced following fitting of anti-spin parachute.
- 1 May 87 Resumed flying to commence ‘high-alpha/Carefree handling’ trial. This gave a 25 degree AoA capability and 200 degrees per second roll rate at 1g. Carefree handling at various speeds was tested across the subsonic speed range resulting in an improvement in turn performance.
- 12-21 Jun 87 Performed daily at the 37th Paris Air Show, Le Bourget, including in front of the French president. Pilot: Peter Orme. Paris number 203 applied in black numerals on either side of the fuselage under the cockpit. On return to Warton the aircraft was flown by pilots from the MoD, Alenia, MBB and Italian Air force.
- 14 Jun 87 EAP performed its one hundredth flight during the Paris Air Show.
- Jul 87 By this date the EAP had been flown 116 times by a total of ten test pilots.

- 7 Dec 87 Commenced third phase of flying. Intended to expand the supersonic envelope and perform Flight Loads Survey testing.
- Latterly employed testing systems for the new EFA, such as direct voice input and multi-function cockpit displays. Flights 149-189 involved conducting aerodynamic load survey tests.
- 28 Mar88 End of third phase of test flying. Several modifications had been carried out to the directional control laws due to stability issues at high speeds. Control laws were modified which allowed the aircraft to proceed above the speed of Mach 1.64/650knots and through the wake of other aircraft.
- 27 Jul 88 Commencement of the fourth phase of flying. This was the first that was in support of the Eurofighter development programme and was to identify flight loads for comparison with data from wind tunnel models. The aircraft appeared with black transducers over the port front and rear fuselage, port upper and lower foreplane and port upper and lower wing, including flaperons.
- 14 Dec 88 End of fourth phase of flying
- 1989 Fifth phase of flying, in support of the Eurofighter development. EAP fitted with a Eurofighter style airbrake, requiring removal of part of the spine. This was not operable when in flight and could only be altered when the aircraft was on the ground. It was tested at 15, 30 and 45 degrees and tested up to speeds of Mach 0.9 with pressure transducers fitted to spine, fin, airbrake and canopy.
- Other trials included Electromagnetic Compatibility trials at Warton and Boscombe Down.
- Apr-May 89 Flights 190-196 tested the airbrake for the Eurofighter.
- 4 Oct 89 Performed at RAF Scampton for the Red Arrow's Silver Anniversary Airshow along with BAe's single seat Hawk 200
- Jan 90 Laid up at end of month for major servicing and installation of various new systems, by which time it had flown 155 hours over 210 flights.
- 12 Oct 90 Commenced sixth phase of flying, in support of the Eurofighter development. This was with the revised 'Full Standard' control law structure and involved carefree handling and speed envelope expansion to Mach 2 between flights 213 and 242. A seventh and final phase involved the testing of an In-flight Flutter and Structural Coupling Mode. This

allowed pre-programmed control input to be imputed via the Flight Control System without the need for manual input.

Also carried out air-to-air tracking against synthetic and real targets for assessment for Eurofighter in this phase.

1 May 91 Last flight; Withdrawn and stored at BAE Systems airfield at Warton, Lancs, having made 259 test sorties totalling 195.21 flying hours, during which it had reached speeds of mach 2+ and angles of attack of over 35 degrees in controlled flight.

Engines (RB199 104E, serial numbers 9001/2/3) transferred to pool for use in Eurofighter DA2 ZH588 which carried them until 1998.

27 Jun 96 By road to Loughborough University Department of Aeronautical, Automotive Engineering and Transport Studies, on loan from BAE systems. Used for undergraduate students to carry out design appreciation exercises.

As an instructional airframe it replaced fly-by-wire Jaguar GR.1/ACT XX765, which moved to RAFM Cosford at the same time. Displayed with port wing removed (but placed against a nearby wall). Photos – Aircraft Magazine February 2011 p.7 and January 2012 p.38.

27 Mar 2012 Moved by road to RAFM Cosford for display, being loaded at Loughborough for road movement the previous day. Photo moving into MBCC at Cosford for initial storage – Classic Aircraft May 2012 p.10. Given some attention in MBCC October 2013.

5 Nov 2013 Placed on public display in Test Flight hangar at RAFM Cosford. Photos – Flypast February 2014 p.14; Aviation News February 2014 p.18; Aeroplane Monthly January 2014 p.7.

11 June 2017 On temporary external display at the annual RAF Cosford Air Show. Photo – Aeroplane Monthly August 2017 p.96.

TEXT; ANDREW SIMPSON/NICK STURGESS

RAF MUSEUM 2018