



# Rochester Avionic Archives Newsletter

## From the Curator.

We have had a lot of anniversaries to celebrate recently. The first flight of Concorde took place 50 years ago and two first flights happened 25 years ago that of the Eurofighter Typhoon and also the Boeing 777. A rather different event to commemorate was the withdrawal from service of the venerable Tornado.

On a business front your Curator went to a meeting at Brooklands which should link the RAA into an Aviation and Aerospace Archives initiative to create common standards and access to collections. Meanwhile the collection of memorabilia of the late Ron Howard has finally started its journey back from Australia by a slow sea route.

The website is soon to be updated yet again to a format called ARK and hopefully this should give us an even better 'public face'. Currently our site is receiving around 68 hits a day.

Chris Bartlett  
Curator

## The Eurofighter Typhoon. First flight 27 March 1994.



Peter Weger makes his Maiden Flight in Eurofighter Typhoon DA1 from DASA at Manching, Germany.

© Eurofighter

The Typhoon was designed originally as an air superiority fighter and is manufactured by a consortium of Airbus, BAE Systems and Leonardo which conducts the majority of the project through a joint holding company, Eurofighter Jagdflugzeug GmbH formed in 1986.

The aircraft's development effectively began in 1983 with the Future European Fighter Aircraft programme, a multinational collaboration between the UK, Germany, France, Italy and Spain. Disagreements over design authority and operational requirements led France to leave the consortium to develop the Dassault Rafale independently. A technology demonstration aircraft, the British Aerospace EAP, first took flight on 6 August 1986; the prototype of the finalised Eurofighter made its first flight on 27 March 1994. The aircraft's name, Typhoon, was adopted in September 1998; the first production contracts were also signed that year.

### BAE Systems (Rochester) Equipment on the Eurofighter.

- Flight Control Computer.
- Head Up Display.
- Helmet Mounted Display.
- Engine Management Unit.
- Total Fuel Flowmeter.
- Dry Fuel Flowmeter.
- Air Data Transducers.
- Wing Pylon Station Units.



Curator: Chris Bartlett, Deputy Curator: Ann Jackson, Secretary Geoff Harvey  
Tel: 01634 203321

e-mail: [info@rochesteravionicarchives.co.uk](mailto:info@rochesteravionicarchives.co.uk)

Website: [www.rochesteravionicarchives.co.uk](http://www.rochesteravionicarchives.co.uk)

## The Boeing 777. First flight 12th June 1994.

The Boeing 777 is a long-range wide-body twin-engine jet airliner developed and manufactured by Boeing Commercial Airplanes. It is the world's largest twinjet and has a typical seating capacity of 314 to 396 passengers, with a range of 5,240 to 8,555 nautical miles (9,704 to 15,844 km). Commonly referred to as the "Triple Seven", its distinguishing features include the large-diameter turbofan engines, long raked wings, six wheels on each main landing gear, fully circular fuselage cross-section, and a blade-shaped tail cone. As Boeing's first fly-by-wire airliner, it has computer-mediated controls. It was also the first commercial aircraft to be designed entirely with computer-aided design



The first flight for the Boeing 777, equipped with Pratt & Whitney engines, was made on 12th June 1994, under the command of John E. Cashman; the co-pilot was Kenneth Higgins.

The 777's first flight was also the first one to take place before the eyes of the media (and before the eyes of the World), in one of the first massive Boeing's PR operations of the time. The first flight of the Boeing 777 was attended by thousands of people at Paine Field Airport, in Everett, Washington.

### BAE Systems (Rochester) Equipment on the Boeing 777.

- Primary Flight Computer.
- Slat & Flap Electronic Control Units.
- In-Flight Battery Backup Unit (BBU).
- In-Flight Entertainment System.

## Concorde. First flight 2 March 1969.



The Aérospatiale/BAC Concorde was a French-British turbojet-powered supersonic passenger airliner that was operated from 1976 until 2003. It had a maximum speed over twice the speed of sound at Mach 2.04 (1,354 mph or 2,180 km/h at cruise altitude), with seating for 92 to 128 passengers

"She flies, she flies." Millions of television viewers in Britain heard commentator Raymond Baxter's excited shout as Concorde 001 took to the air on the 2nd March 1969. The pilot was Andre Turcat. Concorde entered service in 1976 and continued flying for the next 27 years.

The Flight Controls were designed on the cusp of the digital world but were entirely analogue. This was because of the multiple inputs required and the known reliability. The system is designed to allow "hands off" control of the aircraft from climb out to landing. There are 2 main parts to the system; the Autothrottles and Autopilot, and a number of associated systems, such as the warning displays and test systems. The Autoland system on Concorde is very sophisticated and could land the aircraft better than the pilot on many occasions! Just before landing, data from the radio altimeters is fed into the AFCS to flare and land the aircraft. The pilot, does however, have to stop the aircraft!

### BAE Systems (Rochester) Equipment on Concorde.

- Autopilot and Flight Director Computer.
- Autopilot Controller.
- Autothrottle Computer.
- Artificial Feel Engage Switch Unit.
- Electric Trim Engage Switch Unit
- Warning & Landing Display.
- Quadruplex Hydraulic Actuator.
- Pitch Relais Jack Sensor.
- Pitch Feel Sensor
- Stick Force Sensor
- Automatic Test Equipment

## Tornado

The Tornado, nicknamed the 'Tonka', was retired by the RAF in a flypast on 14 March 2019. This brings to an end four decades of distinguished operational history with the UK Royal Airforce. A disbandment parade and flypast marked the end of an era after a valedictory airborne tour of the UK over some weeks.

The last flight was flown by Squadron Leader Ian 'Doorknob' Dornan and Squadron Leader Stephen 'Bamber' Beardmore.



The Tornado prototype made its first flight on 14 August 1974 from Manching airbase, in what was then West Germany. Deliveries of production Tornados began on 27 July 1979. The aircraft entered service in 1979 and first saw combat in the first Gulf War, playing a major part in the RAF's contribution to Operation Desert Shield and the liberation of Kuwait. In 1997, the GR1 was upgraded and its successor, the GR4, was given upgraded avionics and the ability to carry cruise missiles.

By the time Tornado production ended in 1998, just short of a thousand had been built. Did you know that 'Tornado' was originally to be called the 'Panther'?

### BAE Systems (Rochester) Equipment on various types of Tornado.

- E-Scope Terrain Following Display
- TV Tabular Display
- Electronic Head Down Display
- Display Waveform Generator
- Head Up Display for GR4
- Combined Radar and Projected Map Display (CRPMD).
- Tornado Advanced Radar Display & Information System (TARDIS)
- Quadruplex Actuators
- Fuel Flow Transmitters.
- Fuel Flow Rate Indicators.
- Weapon Programming Unit.
- Weapon Control Panel
- Pylon Decoder Units
- Data Entry Unit
- Spin and Incidence Limiting System (SPILS)
- Auto-Pilot Flight Director.
- RB199 Engine Control Unit.

### Yet more about the Hangars!

#### No, they didn't come from somewhere else!

Local RAeS records state that the earliest Hangars were acquired from Cardington, in Bedfordshire, and were then reassembled at Rochester Airport by Redpath Brown (now part of Tata Steel). The design was said to be a twin, black apex roof pair. The story cannot be proven and the only link to Cardington is that Short Brothers originally established the Cardington site to build Airships and of course later built the factory at Rochester Airport.

The same records have the story that the Hangar with the curved roof came from the Kingsnorth (Hoo) Royal Naval Airship Station. Again, the story is that this long Airship Hangar was basically reassembled in two halves side by side backing on to the South side of the 'Black Shed' apex roofed Hangar.



The new Hangars under construction in 1938.  
(RAA Archives)

However, the curved roof Hangar at Kingsnorth was a German 'Parseval' shed dating from 1914 and it was constructed of wood, so it was not this one that was moved to Rochester.

The 40' Hangar at Rochester would appear to have been in place before the Kingsnorth one was demolished so it seems that this Hangar was probably constructed as new.



## GPAC

From about 1954, Elliott brothers produced a range of relatively small general-purpose analogue computers called GPAC. The need for, and subsequent use, arose from Borehamwood's early excursions into the field of stability and control of military aircraft.

When Ron Howard joined the Aviation Division at Borehamwood in October 1954, he was asked by Jack Pateman to configure the first GPAC analogue computer for stability and control studies for a Mach 2 interceptor which became the Lightning. Ron Howard believes that the prototype computer was pensioned off in about 1957 to be replaced by an upmarket 40 amplifier version. This computer was coupled to an actual aircraft in a hangar at English Electric's Warton factory so as to close Autostabiliser control loops, the first time such a total system simulation had been attempted. GPAC was also used for autopilot simulation work with Rolls-Royce and went on to become the core of simulator design and testing for the Vickers VC10 airliner. This success led to it being used for the full three axis rig for the TSR2 fighter which Elliotts did at Rochester.

*(Text Courtesy of Simon Lavington's book 'Moving Targets')*



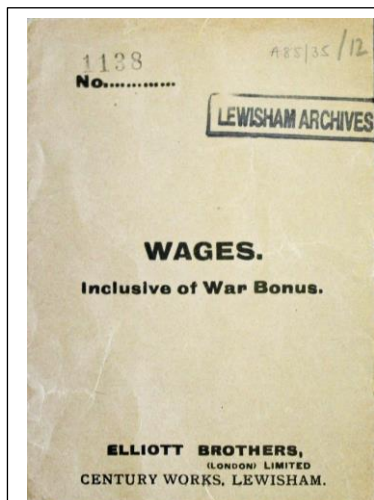
Elliott CPAC (General Purpose Analogue Computer) in use at the Mathematics Department of Northampton College of Higher Technology in London.

*(Lewisham Archives)*



Elliotts Computer Division Personnel 1953. Can anyone help with names?

*(RAA Archives)*



A wages Envelope from the Lewisham site c. 1945.

*(Lewisham Archives)*



### The Display Case from DTL at Middleton

We recently acquired a very nice display cabinet from the closure of the Display Technologies Ltd site at Middleton. This case came from their Reception area and contained a selection of Cathode Ray Tubes used in various BAE Systems displays. We decided to keep the whole set together.

A number of more historic CRTs were brought down including a monster 14" tube. However, we felt that these were too dangerous to hold in the RAA and since they have no relevance to the Rochester site they will go to somewhere like the Science Museum.

Brimar had a factory on the Rochester site after WWII in the old Pobjoy Aero-engine factory. Rank-Brimar were established at Sidcup on a site now occupied by a B&Q store but they eventually moved in 1979 to Middleton. In 2013 BAE Systems acquired Brimar and it became DTL only to be finally closed in 2018 bringing to a close a long heritage of CRT manufacture in the UK.