



Rochester Avionic Archives Newsletter

One of the many tasks we are considering at the RAA is to get a Blue Plaque placed on the buildings opposite Charing Cross Station (see article below). We would also like to place a small descriptive plaque on the two graves of the Elliott brothers; one of the graves is totally unmarked.

The redevelopment of the Rochester site has now received planning permission and at some point, in the future the buildings currently occupied by the RAA will be demolished. Once again, the museum will be on the move and it is quite exciting to plan for this.

This Newsletter continues with the story of the Rochester site and a description of the various Queen's Awards the Company has received. Information about the development of the equipment on the English Electric Lightning came from the book written by the late Ron Howard and I hope to place more excerpts in later Newsletters.

Chris Bartlett, Curator

Application for a Blue Plaque

Coutts Bank occupies buildings opposite Charing Cross Station, including No.449 the Strand, in the City of Westminster. A major thoroughfare, the Strand runs east to west from Trafalgar Square to Temple Bar. Named from the Old English 'strond', meaning the edge of a river, as before modern embankments and land reclamation it ran alongside the north bank of the River Thames. No. 449 is part of a triangular island block of shops and offices between the Strand, Adelaide Street and William IV Street (formerly King William Street). The block, comprising numbers 440 to 449, was built in 1830-32 as part of the West Strand improvements, planned by architect John Nash and executed by William Herbert. The block has circular corner pavilions, known as "pepper pots", with three storeys, an attic with a balustrade, and cast-iron balconies around the first floor. In the nineteenth century this was the office of The West Strand Telegraph Company, the 'Central Station' of the Electric Telegraph Company, which was established in 1846 to connect major cities and towns by electric telegraph.

No. 449, The Strand became the offices and works of Elliott Bros from about 1858 when the Charing Cross station was built and Elliotts were forced to relocate from 50, The Strand.



449 the Strand
Wikimedia Commons

London's famous blue plaques link the people of the past with the buildings of the present. Now run by English Heritage, the London blue plaques scheme was started in 1866 and is thought to be the oldest of its kind in the world.

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Problems at St Asaph

In the early days of the A-7 Corsair II HUD programme a representative from Vought Aeronautics Company went up to North Wales to assess the capability of PPE to make the lenses for the optical system. This was a challenging experience for him as this extract from his notes shows:

“ One other incident occurred which I remember very well. I tried to make a collect call to the plant in Dallas. This was before direct International dialling and I was giving the operator all the information when she interrupted me with the question "From what exchange are you calling, Sir?" I told her I didn't have the foggiest idea and she sweetly replied that the exchange was the word printed before the numbers on the dial of the telephone. I looked at the rotary dial and the word was something like LLCWNWYCHALLCWYN. I told the operator to just skip it I would call from another country.”



The A-7 Corsair II Head Up Display optics showing the large exit lens.

Tornado assistance

The RAA was approached by the Panavia Tornado Preservation Group at the South Wales Aviation Museum (SWAM) at St Athan who are restoring Tornado ZA326, the world's only Tornado GR.1P aircraft. They were after any information we might have about the Ferranti type XD00366/1 display, an experimental colour Head-Down Display fitted in the rear cockpit.

Amazingly we found the drawings in the Rochester library (Many thanks to the Chief Librarian) and although the drawing quality is poor it is good enough to work out the front panel dimensions to allow the Group to make a 3D model.

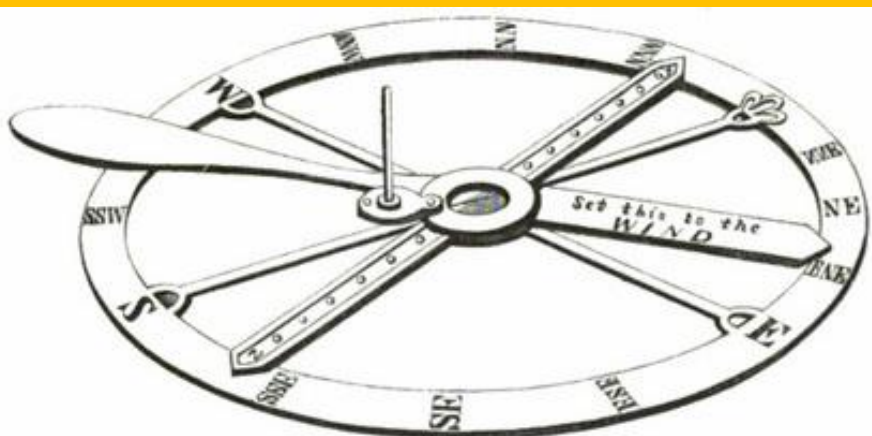
The display seems to be a prototype of a colour E-Scope (the Terrain Following Display) for which Ferranti bid a Beam Index solution and Rochester, who were then a competitor, bid a Liquid Crystal Shutter display. Shadow mask tubes could not be obtained in that size and LCD were too immature.

The display would be fitted to the front cockpit in production but was evaluated in the rear cockpit. Ultimately neither solution was accepted and the Tornado continued to use the monochrome CRT based E-Scope.

ZA326 spent its entire 22-year career as a trials aircraft, taking part in the development of terrain-following radar, all-weather approach, cockpit voice recognition and stores/weapons carriage research.



The Typhodeictor



In 1849, Lt Col J.A.Lloyd invented, the Typhodeictor or storm-pointer, an instrument for obtaining by inspection, the bearing and relative position of a revolving storm or hurricane. It was manufactured by Elliott & Sons (sic) and described (below) at the Great Exhibition in 1851

‘It is now fully determined that the greater storms of the tropics are revolving masses of air, moving onward at a great rate. If a ship becomes involved in one of these, she is soon disabled, but by the investigation of the law of these storms by Lieut.-Col. Reid, an easy method of determining the direction of their movement is given, and thus the mariner is enabled to sail out of their influence.’

The Queens Awards -1970

In 1970 the Company was awarded two Queen's Awards: one for Technology and one for Export. These were for the A-7 Corsair Head Up Display and for the C-5A Galaxy equipment. September 26th, 1970, saw the presentation of the Awards and the day was also an Open Day for Elliott Flight Automation. The Awards Ceremony took place in the front car Park with an audience of distinguished people and of course employees. Speeches were made by Jack Pateman, Lord Cornwallis and the Bishop of Rochester Dr R.D. Say. The Band of the Royal Corps of Engineers gave fanfares and music and the local Air Cadets gave a guard of honour. Mrs Olive Townsend and Mr Ray Skinner received the Award on behalf of the Company but the newspapers do not state in which departments they worked. It is interesting that the Evening Post states 'Award' singular; only one can be seen in the press pictures and the Company has just the one Award block. So it would seem that there was one award for two programmes and for both Technology and Export. Messages of support were received from Mr. D.P. Appleby, Vice-President of the Vought Aeronautics Company and from Mr W. F. Kalmbach, Director of Materiel in Lockheed-Georgia Company. Ultimately over 2500 A-7 HUD systems were delivered and 58 of the systems for the C-5A The Air Data Computer contract was the first total avionics equipment contract ever awarded to a UK company from a United States military aircraft manufacturer.



The Company was given a glass block engraved with the category of the award. In this case "The Queen's Award to Industry 1970". Note that as in the early award the 'E' for Export or 'T' is not placed in the centre of the logo.



The pictures below show:
 Top left is the A-7 Corsair Head Up Display
 Top right is the two A-7s flying over Rochester Airport on the award day.
 Bottom left is the Energy Management Computer
 Bottom centre is the Crosswind Casting Computer (controlling the C-5A Landing Wheel steering)
 Bottom right is the C-5A Air Data Computer (known as the Cog Box!)



The Rochester Airport site of BAE Systems- Post War closure.

With the ending of the War, Stirling production ceased but the Minister of Aircraft Production, Sir Stafford Cripps, visited Rochester and gave an assurance that Shorts were part of the post-war aircraft industry and that there would be a minimum of 4000 workers employed there. The Airport plan of 1946 shows how much construction had taken place on the site.

Shorts continued work on two prototypes of the Sturgeon naval bomber. However further reductions in contracts alarmed the unions and the workforce was drastically reduced. A new approach was made to the Government in October 1945 addressed to the new minister, Mr John Wilmot, who somewhat reluctantly agreed to meet a deputation from the Medway towns. The day before the meeting was due a telegram was received to say that the Minister would after all be unable to attend. The Government had decided to concentrate Shorts production in Belfast and on the 7th June 1946 the closure of the Shorts Medway Towns factories was announced in the national press. The closure was announced in a speech on 12 June 1946 to the employees at the airfield factory by Mr. A. Woodburn, M.P., Parliamentary Secretary, of the Ministry of Supply. He stated that '*The buildings here at Rochester are not really worthy of a first-class aircraft factory. They were erected at different times and at different standards of efficiency: they represent not a well-designed whole, but a collection of separate buildings ill-suited for the purpose of an aircraft unit. The airfield is also too small for many modern types of aircraft and cannot be extended.*'

The Ministry of Supply issued a statement which showed concern that the 'water facilities' of the Medway were seen as inadequate for the efficient development and production of the larger and heavier Flying Boats anticipated. The facility at Belfast had no such limitations and the factory was both large and modern. A deputation from Rochester Chatham and Gillingham comprising MP's, civic heads, Trade Union officials and employees met with Mr Woodburn and suggested that unemployment in the Medway towns would reach 15,000 unless Short's factory was retained. The following day (June 14th) sixty shop stewards called on employees to 'down tools' to protest against the closure and five thousand workers marched through the Medway towns in the biggest industrial demonstration Kent had ever seen.



To keep Short Brothers in the Medway Towns, a mass meeting was held on Jackson's Field on 18 June 1946. One of the largest demonstrations ever held in the Medway Towns, with 8,000 marching, it was led by the Shorts' own works band (foreground) and was addressed by several speakers, including, seen here in full flow, Gravesend MP Garry Allighan, a leading campaigner for Shorts remaining in the Medway Towns.

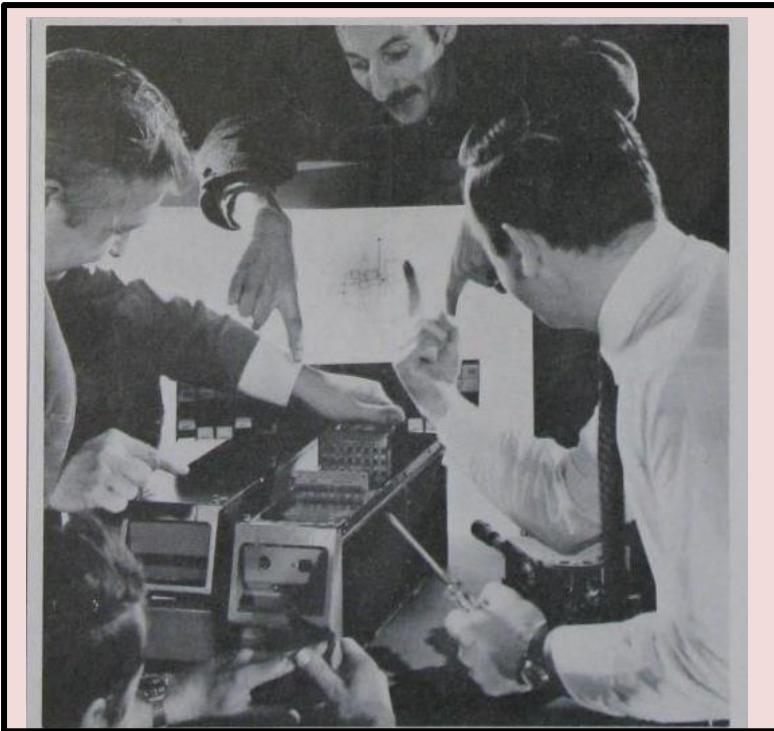
Courtesy of 'Short Bros, The Rochester Years'

However, all work in progress including prototypes was removed and in 1948 the works was completely shut which resulted, as expected, in severe local unemployment. Without the vitality of industry to support them, Airport Works, to the North, and the Flying School site, to the South, became scenes of dereliction. Things looked very bad but, already, the germ of a recovery was incubating. The Board of Trade announced that they had in hand the task of introducing suitable alternative industry to Rochester.

It took a few more years for the final connections with Shorts to cease. During 1953 Shorts reopened their overhaul and manufacturing facility at Rochester because their Belfast plant was overwhelmed with work on the new Comet 2.

At Rochester work was done to convert the Short Sturgeon and to carry out overhaul on such aircraft as Beaufighters and Mosquitos. Spares were also manufactured for various aircraft. However, the Comet tragedies of 1954 meant that work in Belfast was suspended so the activity at Rochester was transferred back. Short Brothers gave up the last of their facilities at the airport on 13th June 1962 [70]. A Deed of Surrender was made between Short Brothers and Harland and the Mayor, Alderman and Citizens of Rochester. There was however a Shorts office within the Company for the Flying Services Division until 1964.

The Rochester Airport site of BAE Systems will be continued in the next Newsletter.



Engineers can make do with plain pictures of black boxes against a blank background, but for "yer actual publicity picture" you need human interest, warmth and atmosphere. Someone ought to be working with a screwdriver, inspecting, adjusting or pointing to a significant feature. Choose experienced, intelligent-looking people, and whatever you do, keep the photographer from popping up over the back of the scenery. Hold quite still now! There, I'm sure 'The Times' will print that!
EFA News Dec 1969



© Museum of Applied Arts & Sciences, Australia}}

This camera lucida projects an image of an object or scene onto a flat piece of paper to help the user draw by simply tracing the image. The Elliott Bros logo is embroidered inside the box and is rather unusual with the crown.

A Camera Lucida

The English Electric Lightning

The prototype of the Lightning of the English Electric P1 first flew on the 4th August 1954. Elliotts already had the contract for the 3-axis stabilisation system for the aircraft and was competing for the significant MK-13 autopilot. Both were very advanced engineering concepts for the time, but even then, would only be the precursors of the final interception standard equipment for which requirements were already being evolved.

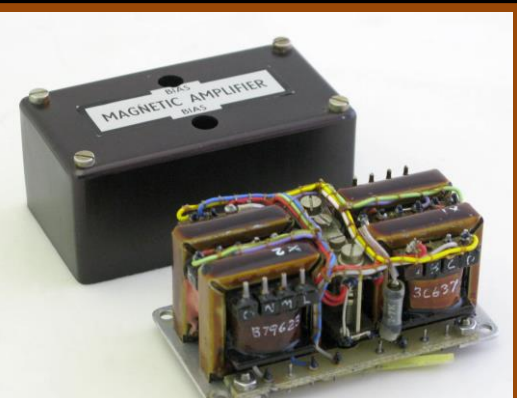
There were three distinct automatic controls systems in the Lightning of differing complexities, 3-axis autostabilisation, autopilot and auto throttle. The "Auto-stab" supplemented the basic aircraft short period aerodynamics and was designed to be engaged full-time. The Auto-throttle was designed for use with the ILS (Instrument Landing System) auto-approach coupling mode in the Autopilot.

The MK13 autopilot was first formulated around an electronic valve (vacuum tube) analogue computer, the most advanced technology at the time, but this could not meet the environmental conditions, even with the so-called ruggedised valves designed for the early guided missiles. Magnetic transducer amplifiers while capable of meeting the Lightning environmental requirements, still involved significant packaging and space penalties which needed to be overcome. Fortunately, in Dr E.H. Frost-Smith, Elliotts at Borehamwood had an expert and he came up with a miniaturised design (shown on the right).



The prototype of the English Electric P1 Lightning at Warton

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Snippets from the early days

Bluebell Hill eruption!

Way back on the F-16A/B Head Up Display project it was often a last-minute effort to achieve the deliveries that General Dynamics demanded. In March 1980 it was going to be a disastrous month, so since Mount St Helens in Washington had recently erupted the project team decided to let the General Dynamics buyer know that Bluebell Hill had also erupted and halted deliveries. This at least was greeted with good humour and bought us time to recover the situation.

The Cost Increase of Concorde- some interesting comparisons!

'The recent increase in total Concorde cost can also be seen in perspective. The £835 million is the total cost to Britain and France of the whole eleven-year programme until production is under way in 1973. The year-by-year expenditure is equivalent, in Britain, to the sum spent on false teeth, in the public sector, or domestic pet food in the private sector. In France, the cost is the same as the French dairy produce subsidy and Concorde costs France half as much as alcoholism. Ultimately, the commercial return on the Concorde programme is likely to be measured in thousands of millions of pounds.'

December 1979 EFA News

A ha'p'orth of tar!

The F-16A/B Pilot's Display unit had to be painted a very particular matt black colour and the Company simply ran out of paint one day. The co-producers in the Netherlands and Norway were contacted and although they did not make the PDU, Norway had some spare so one of the project team was duly sent off to in Norway in the Company Aero Commander 680. This is a distance of around 730 miles which is mostly over the sea but still well within the range of the aircraft. The mission was successful and deliveries recommenced.

The BAC 3-11

The BAC2-11 (Two-Eleven) and BAC3-11 (Three-Eleven) were British airliner studies proposed by the BAC in the late 1960s although neither made it to the prototype stage. The BAC 3-11 was a widebody airliner, in a similar class in terms of size, weight, and range, to the original Airbus design. However financial support was not forthcoming largely because of the political implications of competing with Airbus. In 1970, the Minister for Aviation Supply, announced in the House of Commons that there would be no official backing from the government and BAC quietly shelved its plans for the type during the following year.

Elliott's had supplied the Automatic Flight Control System for the successful BAC 1-11 and proposed a digital AFCS called the E80AFCS. The system had some new items; the Director Autopilot Mode Organisation Computer (DAMOC) and the Mode Organisation Data Transmission System (MODATS). The DAMOC was a programmable digital Computer with a 4k word store. The system concepts were developed for later digital AFCS .



On the left is an artist's impression of the proposed BAC3-11 and to the right is the cover of Elliott's proposal for the AFCS

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