



# ***e-DEFENCE ELECTRONICS NEWSLETTER***

The e-NEWSLETTER OF THE DEFENCE ELECTRONICS HISTORY SOCIETY  
No 84: July 2019 Part I

---



## **LEARNING FROM HISTORY**

A decade ago, your Editor lectured at RUSI to a group of senior military and industrial colleagues about the development of radar in the UK in the late 1930s, and observed in his talk that, during the procurement process, great care was taken to examine foreign shareholdings in the firms seeking to build Chain Home's radar transmitters and receivers, but nothing was inserted into their contracts regarding where those firms could or could not source the components – with the result, yes, that some parts came from **Italy, Austria and Germany!** The laughter at the actions of those sepia-tinted days died away as I posed the question “Where do you buy your parts now?” Just a few days ago, it became public that certain circuit boards for the **F-35**, backbone of US and UK air power, came from, yes, **China**. Clearly, it has been decided that history has nothing to teach us ...

Nothing daunted, a wide-ranging series of articles in **eDEN** this month, from the **Japanese Paper War Balloons** as reported by the Air Ministry's Weekly Intelligence Summary of August 1945, to bringing to your attention **Fred Starr's** investigation of **Frank Whittle's** original 'thesis' in 'The Origin of the Jet', and from the **USA's ANTRACS (AN/TRC's)** continent-spanning radio relay systems to the

highly specific **'Mystery Valve'** from the late **Graham Winbolt's** collection, on whose identification **Chris Cooper** asks our help and thoughts.

In our Part I, we take a particular look at **Identification Friend or Foe (IFF)** systems, always a subject of relevance because it is literally a subject of life and death, and very much more so nowadays when the added complication of drones is considered. **Richard Trim's** well-illustrated 1999 paper **'Identification Friend or Foe: A Brief History'** details the background going up to the end of the last century, and **Ian White** contributes a detailed paper on the early systems in his **'The Origin and Development of Allied IFF During World War II'**. Next, **'Jacey' Wise** considers the neglected topic of **U-Boat VLF-MF Communications and Direction-Finding**, for HF/DF, "Huff-Duff", is well covered in the literature – VLF/MF, much less so. The meticulous and tireless **Mike Dean** then reviews two lesser-known intercept receivers – the **Receiver R1334 also known as 'The T.R.E. Receiver'** (does anyone know of the whereabouts of one today?), and the US **Naval Research Laboratory's XARD**.

In Part II, we carry forward the story of the advance of Allied Armies in Europe beyond D-Day, and, in addition to **W Marks, O. Perkins and W Clark's Radio Relay Communication Systems in the US Army** detailing the AN/TRC system and its operational use in North Africa, Sicily and Italy through to D-Day and after, we have a most useful website contribution which sets out the **21st Army Group's Signals Equipment**. Last month, I wrote a *Tailpiece* about some of the less well known ships of D-Day (TIDs, CHANTs and VICs) and *Tailpiece 2* this month similarly examines an almost unknown use of **H2S** by the Navy's rocket-firing landing craft and other vessels, triggered by a query to our good friends in **MRATHS** and answered from **Derek Howse's** excellent **Radar at Sea** by **Mike Dean**.

Our busy year for DEHS members continues, with special emphasis on the **Bawdsey Radar Trust's July events**; **IEEE's HISTELCON on 18/19 September in Glasgow**, immediately followed by **IET's History Weekend in Dublin on 21 September**; and then our 'autumn of secrecy', with **Arthur Bauer** and the **Cryptomuseum's** ever-popular **'Secret Communications' events in Arthur's museum in Duivendrecht, Amsterdam** on five dates - **16 & 23 November, 7 & 21 December, and 12 January 2020** - and of course **DEHS's Security and Intelligence Conference at the Science Museum's Dana Centre, London on 27 November**.

It has been commented that **eDEN** does not lack for articles, a fact due to the vast variety of interests of DEHS members and of their willingness to write – as witness the fact that we have significant forthcoming articles by **Paul Marks** on the **Bathythermograph**; on the **Indicator 6 'family'** where many members have contributed; and a series on **Restoration**, beginning with the top-class work of **Tony Waller**. As a result, **eDEN** has gained a significant reputation in its field, and we now feel able formally to invite both academic and individual contributions on any topic where military electronics are involved; we publish speedily (there is a two year plus waiting list for some Journals), regularly, and – unlike the sad practice of some journals who now charge, in one form or another, to have articles published, and take your copyright – we make no charge and the author(s) retain their copyright. **Publish in eDEN and Transmission Lines!**

As ever, my grateful thanks to **Mike Dean** for his invaluable help, and suggestions for improvements, offers of articles and all general comments to me at [philjudkins@btinternet.com](mailto:philjudkins@btinternet.com) or [info@dehs.org.uk](mailto:info@dehs.org.uk).

Warmest regards all

Phil

Dr. Phil Judkins, DEHS Chairman.

# DEHS CONFERENCE ON SECURITY & INTELLIGENCE

WEDNESDAY 27 NOVEMBER 2019

On July 10<sup>th</sup>, The Science Museum will be opening a new exhibition, '[Top Secret: from ciphers to cybersecurity](#)', Tickets are free but can be booked at <https://www.sciencemuseum.org.uk/see-and-do/top-secret> The exhibition has been curated by **Dr Elizabeth (Liz) Bruton, Curator of Technology and Engineering at the Science Museum, and DEHS committee member.** She is also a committee member of the IET History of Technology Network.

From the trenches of the First World War to the latest in cyber security, *Top Secret*, which coincides with the 100th anniversary of GCHQ, the UK's Intelligence, Security and Cyber agency, explores over a century's worth of communications intelligence through hand-written documents, declassified files and previously unseen artefacts from the Science Museum Group's and GCHQ's historic collections.

- Trace the evolution of the gadgets and devices used to conceal crucial messages and to decode the secrets of others.
- Hear from GCHQ staff doing top secret work to defend against terror attacks and serious crime and discover the challenges of maintaining digital security in the 21st century.
- Explore the story of Alan Turing and the team of Bletchley Park codebreakers who broke the Enigma code in 1941, uncover spy-craft from 1960s Cold War espionage and challenge your friends and family to become codebreakers in our interactive puzzle zone.

**To coincide with this exhibition, (DEHS) is organising 'Security & Intelligence'.**

The Science Museum has kindly allowed the DEHS to hold the conference in the Dana Centre, located in Queens Gate, which is only a short distance from the main museum building. The only cost will be for refreshments and will be approximately £25.

- The Keynote Address will be given by **Tony Comer, GCHQ's Departmental Historian.**
- **David Kenyon, the Bletchley Park historian,** will give a talk on the History of Bletchley Park.
- **Dr Helen Fry** will give the talk 'Listening-in: what was discovered from senior German POWs in WW2'.
- A senior representative from the National Cyber Security Centre who tell us of the present-day cyber threat.
- **Olga Topol, of the Pilsudski Institute in London,** will give a talk on the Enigma Double Machine.
- **Dr Edward Stansfield,** previously a senior manager at Racal Research, is an expert on speech coding and will outline the workings of vocoders
- DEHS President **Keith Thrower** will give a talk on the Fullerphone which was used to provide secure Morse communication across the battlefield in the two World Wars.

**The Newcomen Society** and the **IET History of Technology Network** are co-sponsors.

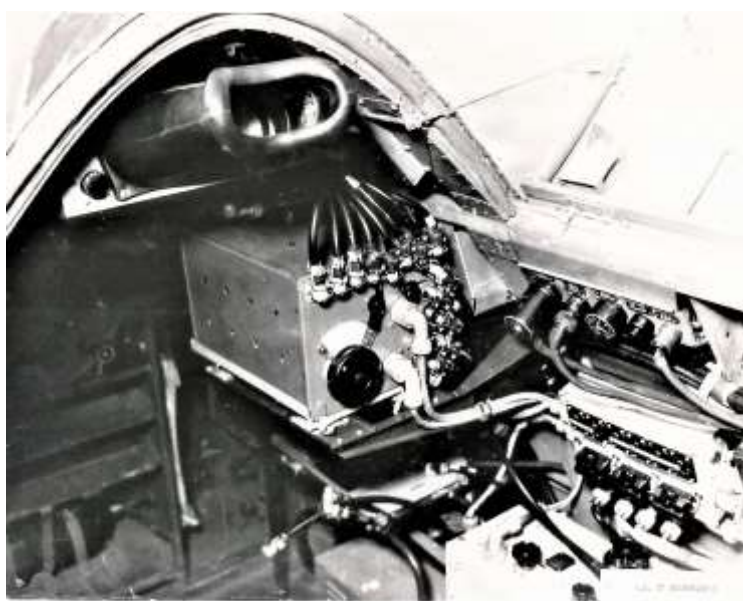
The conference will conclude at 4 p.m. and Liz will then take us through to the exhibition and give a conducted tour.

**Very few places are now left - please book TODAY to avoid disappointment.**

Email: [kthrower@waitrose.com](mailto:kthrower@waitrose.com)

## INDEX

Editorial: Learning from History	1
DEHS Conference on Science and Intelligence <i>Keith Thrower/ Liz Bruton</i>	3
Index	4
IEEE HISTELCON 2019 <i>Professor Tony Davies</i>	5
Bawdsey Radar Trust: July Events	5
Ops Board	6
Japanese Paper Balloons <i>Air Ministry Weekly Intelligence Summary 312, 27.8.1945</i>	7
U-Boat VLF-MF Communications and Direction-Finding ‘Jacey’ <i>Wise</i>	11
The Origin and Development of Allied IFF During World War II <i>Ian White, AMRAeS</i>	13
Identification Friend or Foe: A Brief History <i>Richard Trim, OBE</i>	31
Receiver R1334 aka ‘The T.R.E. Receiver’ <i>Mike Dean</i>	66
Publish in eDEN! Forthcoming: Bathythermograph, Ind 6, Restoration and more!	74
Naval Research Laboratory’s XARD receiver <i>Mike Dean</i>	77
Your Help Please! Mystery Valve <i>Chris Cooper</i>	87
DEHS Publications	89
Tailpiece: The Origin of the Jet? <i>Fred Starr</i>	90
<b>Part II: Communications after D-Day</b>	91
Radio Relay Communication Systems in the US Army <i>W Marks, O. Perkins, W Clark</i>	92
21 Army Group’s Signals Equipment	112
Tailpiece 2: D-Day Naval H2S <i>via MRATHS/ Mike Dean/Derek Howse</i>	137



All in a Beaufighter – but what is the unit in the centre? If you know, “**Publish in eDEN!**”

# HISTELCON 2019

18th-19th September 2019

Technology and Innovation Centre, Strathclyde University, Glasgow, Scotland

[www.histelcon2019.org](http://www.histelcon2019.org)

**HISTELCON** is an IEEE Region 8 conference covering topics in the area of Technology History, held about every two years. Information is available via the website: [www.histelcon2019.org](http://www.histelcon2019.org)

**The primary theme is 'historic computers'** including papers on those inventions and developments which have not already been the subject of extensive historical publications, and to include the contribution that special purpose processors have made to the development and use of advanced digital signal processing methods in many applications areas. Among the computer topics which may be included are, for examples, the history of the F100L and the Viper microprocessor, and the impact of digital signal processing microprocessors including the TMS 320 for the implementation of very sophisticated signal processing algorithms. Sessions to cover other aspects of technology history in the electrical, electronic and related fields will be provided for.

**Invited Keynote speakers** include **Nina Baker** (WES Historian) on the work of Dr. Winifred Hackett, **Peter Grant** (University of Edinburgh) on standardisation of electrical units, and **Simon Lavington** (computer historian, emeritus professor of University of Essex) on Ferranti Computes for UK defence and GCHQ uses).

On the **17th September** there will be an unveiling ceremony for an IEEE History Milestone at the Hunterian in Glasgow to recognise work done for the standardisation of the unit of electrical resistance (the Ohm), to be followed by a free-to-attend technical seminar 1500-1700 on the nearby University of Glasgow campus (registration via Eventbrite).

## BAWDSEY RADAR TRUST

**The Bawdsey Radar Trust are now in their summer season, and events in July are:**

Thursday 4 July **D-Day Deceptions with Radar talk** Join Dr Phil Judkins as he gives an illustrated talk about the various schemes involving radar to help the Allied invasion forces. The talk will take place in the marquee on site and will be repeated during the day starting at 11.30am..

Sunday 7 July 2019 **'Wartime at RAF Bawdsey'** A family event with displays by the Air Cadets, WW2 aircraft models by Ipswich Modellers, paper plane making and aircraft spotter trail and, of course, the Transmitter Block with interactive displays, films and a Boffin Trail for younger visitors.

Thursday 11 July **'Where is that Plane?' Informal short talks during the day.** Join David Heath as he gives short talks on 'Identification Friend or Foe' and 'Where is that Plane?'. The talks will take place on the gallery during the day 11.00am to 4.00pm and bring to life some of the ideas and concepts of radar and its uses.

Sunday 14 July **'Sea and Be Seen'** In partnership with the Marine Coastal Agency and the RNLI, come and find out more about the work of these lifesaving organisations, how radar plays its part in search and rescue and how to stay safe in the water. Included in museum admission and the event begins at 11am.



# OPS BOARD

Thursday 4 July & Sunday 4 August Bawdsey Radar Trust; 4 July D-Day deceptions with radar. 30-minute talk, repeated during the day, about the various schemes involving radar to help the Allied invasion forces; 4 August Secrets and Spies; How the German spies in the Zeppelin flights lost the Battle of Britain (Talk of 30-45 minutes repeated during the day).

Wednesday/ Thursday 18/19 September IEEE HISTELCON 2019, Glasgow – see article above.

Saturday 21 September IET History Conference, Clayton Hotel, Bullsbridge, Dublin, will examine historical engineering and technological innovations created on and from the island of Ireland, examples being the gateway of transatlantic cables in the west coast of Ireland in the 19th and early 20th century, Harry Ferguson's original tractor design, John Boyd Dunlop's invention of the pneumatic tyre, Ulster's maritime and heavy engineering heritage, the more recent evolution of Ireland as one of Europe's leading research centres in ICT hardware, the centenary in 2019 of Marconi's first east-west radio call from Ballybunion, Co. Kerry and the first transatlantic flight by Alcock and Brown landing near Marconi's wireless station at Clifden, Co. Galway. Details at <https://events.theiet.org/conference-on-the-history-of-technology/>

Saturdays 16 & 23 November, 7 & 21 December, and Sunday 12 January 2020 'Secret Communications' events Duivendrecht, Amsterdam. Arthur Bauer and Paul and Marc of the CryptoMuseum present their ever-changing and ever-popular displays of crypto and secret communications devices of all vintages, up to very recently indeed!

*The events are to be held:*  
*Kloosterstraat 23-25*  
*1115BJ Duivendrecht*  
*The Netherlands*  
*www.cdvandt.org*

*On Sats.*  
*16 and 23 Nov 2019*  
*07 and 21 Dec 2019*  
*On Sun. 12 Jan 2020*  
*Opening time from*  
*10.00 to 17.00 h.*

SECRET

COMMUNICATIONS 3