LEO COMPUTERS SOCIETY

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LEO COMPUTERS SOCIETY
WORLD'S FIRST BUSINESS COMPUTER

LEO MATTERS

68 Years

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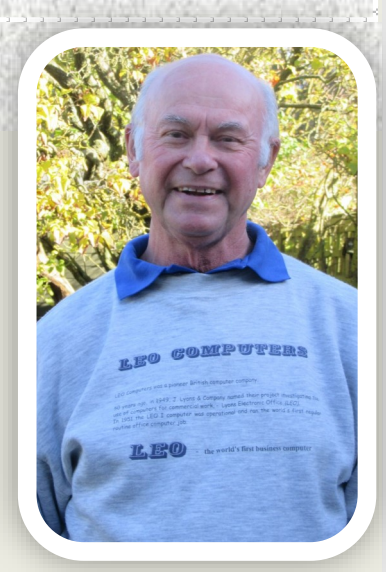
Message from our Chairman – Peter Byford



Welcome to LEO MATTERS

The new title for what was originally "the newsletter" has a useful double meaning, it sums up what the Society is trying to promote whilst also describing the stories about LEO.

You may already have seen our logo, shown above. We must thank Elisabetta Mori for her design of this excellent logo, Elisabetta will be with us until September when her doctoral work is due to finish. We are also showing the Logo for our partners, The Cambridge Centre for Computing History (CCH).

We have a new editor in Vince Bodsworth who is taking over from Hilary Caminer, who edited the last edition and Bernard Behr who published the last few excellent newsletters .

It has been a busy time for the Society. We have established a partnership with the Centre for Computing History (CCH) in Cambridge and with their assistance we applied for and got a Heritage Lottery fund grant to help us with our project to protect and promote LEO's history. More detail about this in this edition. The first step was to recruit an archivist which we have done.

You will recall, I am sure, Lisa McGerty, one of the management team at CCH and whose enthusiasm for LEO started the ball rolling on, firstly, the partnership with CCH and then our successful application for an HLF grant. Following her introductory article in the last newsletter, Lisa describes the HLF process in her article as well giving news of our progress.

Amongst the other "matters" is an article about Autolector. Edd Thomas joined us this year because of his interest in LEO without ever having worked on a LEO machine. He was interested in Lector/ Autolector so we provided him with some documentation and he has produced the Article from this information. I was hoping that one of the dozen or so members who worked with Lector/Autolector might read the article before publication but sadly none of those have responded.

There is news of the Society's persistence, largely one of members, Graham Briscoe's persistence in trying to the copyright of John Simmons' book "LEO and the Managers". John Simmons was LEO's chairman and driving force behind the original development of LEO. Very recent news is that the Society has been given the publishing rights for the book. Graham explains how this happened.

Tony Morgan, our technical consultant, tells us the story of LEO's DME- keeping LEO's software going on non-LEO machines.

On similar lines, the LEO software at LOLA was moved to IBM. Alan Cooper tells us about the Virtual LEO.

Dag Spicer is senior curator at the Computer History Museum at Mountain View, California. He is also our North

American Correspondent. The have a LEO display at the Museum, Dag gives an American view of LEO.

Vince Bodsworth is a volunteer at TNMoC at Bletchley Park, so was the obvious person to report on their activities. One of these is very relevant to us. The EDSAC project brings back to life the machine on which LEO I was based.

Finally Bob Stevenson provides his usual report on those accessing our website, South Korea appears to be surprisingly high as does Luton and Muju-gun? -a South Korean holiday resort apparently famous for fireflies!

Elisabetta Mori continues to make excellent progress with her doctorate and she is doing great work in spreading the word about LEO .

As part of our application for Charitable Incorporated Organisation, we asked for support from some of our museum contacts. I thought I would include a quote from one of them as it is a tribute to all of us in the Society-

The survival and preservation of the LEO collections undoubtedly owes much to the active involvement of the LEO Computers Society, without whom many of these archives would have been lost. In my experience, no similar group takes such an active interest in preserving the heritage of commercial computing in the UK, and I have been impressed by the enthusiasm and knowledge of Society members in promoting the history of the company and its products.

Enjoy the "LEO Matters", I hope to see you at the Reunion in April – it will be a little different from usual and we have an excellent venue for it. There are still some places available, the booking form link is here: ***Reunion***

We are going to be more active on Social media. At present we only have a twitter account (@leocomputers51) – do have a look for new tweets when something newsworthy happens and retweet them. And let us know about LEO items you come across.

We would like to do a second edition of the popular LEO Remembered, so please let us know of any reminiscences that you would be happy for us to publish

Notes on Peter Byford

Peter joined LEO Computers Ltd as a programmer in 1961, straight from school when 17 years old. He enjoyed programming and systems analysis, despite the often long hours (without overtime). A keen sportsman, without much ability, he did play for LEO and Lyons second team at cricket. In 1964 he organised the winning LEO team for the Lyons Pennant day (a multi sport event against other Lyons departments). When LEO was merged with English Electric, he helped David Caminer organise a cricket match between the two companies – working with Mr Caminer was a daunting prospect but a fairly competitive LEO team was assembled, with some Afro-Caribbean members who worked at the Minerva road factory – whatever happened to Winston Jackson, Rodriguez and the others . There were a few incidents in the match, which LEO won.

Peter left LEO soon after the merger and went on to work as a Programming team leader or system analyst at a number of companies & consultancies before joining British Gas Eastern in 1971 initially as a programming team leader. In over 25 years his roles included systems analyst, quality assurance manager and data manager.

During his period at British Gas he was, for a few years, Technical manager of the ICL User conferences. After leaving British Gas in 1996, he became a self employed data analyst, finally retiring in 2005.

Around 1980 Roy Farrant, who had organised several LEO reunions, "passed the baton" to Peter. Thirty-eight years later ..... He says he was and still is supported by excellent committee members over the years. If anyone wants to takeover they would have Peter's blessing.

Peter is married with two children. His daughter and family is in Melbourne, Australia- including two granddaughters. His son is in the UK and family, including twin granddaughters.

Peter's hobbies include family history and home winemaking (he founded the Ware Wine and Beer Circle in 1978). He plays bridge, badminton and golf, although none of these very well.

The National Museum of Computing History "TNMoC" by Vince Bodsworth

The National Museum of Computing (TNMoC) at Bletchley Park covers the development of computers over the past 75+ years, from 1942 to the present day. Of particular interest to LEO Computers Society members will be the fact that the Museum hosts several LEO artefacts. In addition there is an exhibit of a rebuilt EDSAC, the computer that went into production in Cambridge University in 1949 and which was the prototype for the first LEO. In 1949 the Lyons company .took the EDSAC design as the basis for the LEO. The LEO (later known as LEO I) went into production at Cadby Hall, the Lyons headquarters in West London in 1951 running, initially, bakery valuations. This is the first recorded use of a digital computer for a commercial application

The Origins of Bletchley Park

At the outset of WWII the Government Cypher School (GCS, now GCHQ) decamped from London to escape the consequences of German bombing and to get more space to house the large numbers of people that they forecast

were going to be necessary to handle the quantity of decryption of secret messages the War was going to bring. In fact by the end of the war there were about 8000 people working there, in 3 shifts 7 days a week. (Most of these people had not the faintest idea what they were really doing. They only knew their little bit and not what came before or after)

Bletchley Park, a country house with extensive grounds, was acquired to house the GCS as it was far away from any manufacturing or administrative locations that were likely to be bombed and it was roughly equidistant from London, Cambridge and Oxford where the human brains that were going to do the decryption were living. At that time there was a good rail link from each of the 3 cities to and from Bletchley. Very quickly, huts were built to provide office space for all the people who were going to work there, and they continued to be built throughout the war as the operations were extended continually. Many of those huts still stand and some of them house the Museum.

At the outset, the way decryption was done was intellectual and manual. People would study the encrypted messages and using puzzle-solving skills, knowledge of the type of encryption and clues like “this message must be a weather forecast as it came from a known weather ship,” they would try and divine the meaning of certain messages, and, thereby break the cypher to read other messages. Early on, mainly based on work done in Poland on the Enigma machine before the outbreak of war, they started to use mechanical means to assist the cryptologists in their work. Later on, electronic digital machines were also brought to bear on digital encryption methods (However at all times, even right to the end, decryption remained primarily an intellectual exercise with the machines essentially removing a lot of drudgery from the task, and increasing the volume of messages that could be decrypted) It has been estimated that this work at Bletchley Park might have shortened the war by 2 years.

What are the Bombe, Tunny and Colossus?

The main decryption activities of the GCS were first the Enigma, used by the German Army, Air Force and Navy, (different encryption systems but using variations of the same machine) a method of encrypting Morse code so it could be sent over the air waves without any listener knowing what the message was. The Bombe was developed to assist in this. The second was the Lorentz SZ40/42 , a machine to encrypt binary data so that telegraph messages could also be sent over the airwaves with reasonable security (at that time telegraph characters were encoded using a 5 bit binary code, the International Telegraph Alphabet Number 4) . The Lorenz encryption was used by the German High Command for telegraph traffic between Hitler and his generals, so it was of the highest strategic importance. Bletchley Park called the Lorentz code Tunny, and the Tunny machine and Colossus were developed to assist in the decryption efforts.

Mostly people know about the Enigma machine and cypher as the machine's availability preceded the war, and it was a commercial, not military, product. The Bombe was developed to assist in decrypting Enigma originally by the Poles before the outbreak of war, and substantially further at Bletchley Park

Most people don't know about Tunny, as the Lorentz SZ 40/42 wasn't invented before the war (it dates from 1941, developed on orders from the German High Command in Berlin), and the decryption methods used to break it were subject to the Official Secrets Act until late in the 20th century. Suffice to say that the Tunny and Colossus were used to assist in decryption of the Lorentz encryption, and the Bombe for the Enigma.

All installations of all three types of machine were destroyed, on the orders of Winston Churchill, at the end of the war, but Bletchley Park now has rebuilds of all three and these can be seen working when the Museum is open

Post War, the early Mainframes.

This is the section of the museum that LEO and EDSAC occupy, as well as examples of systems developed in Manchester University, Birkbeck College, London and the Harwell Atomic Energy Research Establishment

Some people from Bletchley Park were involved post-war in the development of early computers, although they could not let on to their co-developers what they had actually achieved in the War as it was subject to the Official Secrets Act.

At Bletchley Park Alan Turing, was involved in the Bombe development with Gordon Welchman, He also provided mathematical advice to Bill Tutte in the development of the statistical method to crack the Lorentz cypher. Bill Tutte was the man who essentially reverse engineered the Lorentz machine in the Tunny section under John Newman. Both John Newman and Alan Turing went initially to Manchester University and they were involved in research that led to the development of the Manchester “Baby”, a prototype electronic computer, operational in 1947, only experimentally, and then the Ferranti Mk1. Turing went later to the National Physical Laboratory (NPL) in Teddington where he developed the Ace computer which was commercialised as the Deuce by English Electric. Subsequently English Electric acquired LEO Computers.

TNMoC have rebuilt a version of EDSAC which is now largely working and they expect to have it fully working during 2019. There are also pieces of LEO memorabilia such as Mercury Delay Line tubes and Microcode assemblies on display

The mainframe hall also has working early computers including the wonderful WITCH (Dekatron) from Harwell which first went into operation in 1951, and which has been restored to working operation by TNMoC. (Now in the Guinness Book of Records as the oldest original computer in the world, still operational). The name WITCH arises from its owner after Harwell which was Wolverhampton Technical College. WITCH stands for Wolverhampton Instrument for Teaching Computers from Harwell, and Birmingham University came second, which was a good job (joke)

Many examples of mainframes from the 60's, 70's and 80's such as the Elliott 803 and 903, an IBM 1130 and an ICL 2966 are also exhibited.

The ICL 2966 you could say is a grandchild of LEO and a number of other computers of British manufacture from the 50's and 60's as it represents the consolidated efforts of English Electric LEO Marconi (EELM) and ICT after the merger in 1968 to succeed all the mainframes that went before. After the merger to form ICL a consolidated development team was charged with creating a "New Range" which became the 2900 series. The 2960, the immediate predecessor of the 2966, was the system used to build the, until now, unheralded LEO DME (Direct Machine Emulation) described in another article in this edition of LEO Matters.

Personal Computers and Software

TNMoC exhibits also track the development of desktop computers with a comprehensive display of machines from the early kit machines in the 1970's through Amstrads, Macs, BBC Micro to the IBM PC. There are several machines operational with retro-PC games which keep the young and old kids entertained.

This is completed by a display of hand-held devices such as the Psion, iPod, iPhone etc which bring us up to the present day (almost)

Alongside the PC displays is an exhibit which shows the development of software over the whole period, and which also shows how, in the present day, a household may have many computers embedded in various artefacts, toys, TV's, fridges and so on.

The future for LEO at TNMoC

Once the EDSAC rebuild is up and running the author is promoting the concept of beefing up the LEO exhibit in the same area, with a video and extra displays. After all the EDSAC spawned LEO so it is only fitting that the impact that EDSAC had in the commercial world, as well as in the academic one, is recognised

David Holdsworth, who is a leader in the activities of the Computer Conservation Society (CCS) has developed a LEO emulator and another idea would be to run an instance of this on, say a Raspberry PI, with a terminal in the mainframe area, showing how labour-intensive programming was on these early computers.

Other ideas would be gratefully received,

Visiting TNMoC

You can learn more about TNMoC by visiting their Website.

http://www.tnmoc.org/

General Opening Times

Below are the normal opening times, but please check online for short term variations before visiting

The Colossus and Bombe Galleries are open daily. (10.30am - 5pm. Last admission at 4.30pm)

The rest of the museum is normally open to the public on Thursday, Saturday and Sunday afternoons (12pm - 5pm).

Please note: from 30 November 2018 for an expected three months the First Generation Gallery and the Mainframe and Large Systems room will be CLOSED because the roof is being refurbished. The rest of the museum will be OPEN as per usual times.

Guided Tours usually take place at 2pm on Tuesdays, 2pm on Wednesdays and 10.30am on Thursdays. Booking for tours is recommended.

The museum is also fully open to the public on additional days during school holidays (Easter, Summer, Christmas and some half terms) and bank holidays.

Notes on Vincent Bodsworth

Vincent (Vince) Bodsworth has a Degree in Mathematics and Theoretical Physics from Cambridge University, where he was a member of Queens' college. While at the University he took the opportunity to attend the lectures given by Maurice Wilkes on computer design and the EDSAC in particular.

Following University Vince joined ICT in 1967 soon to become ICL, when EELM and ICT merged. He then met and worked with quite a number of LEO people, including David Caminer, Doug Comish and John Pinkerton to name a few.

Vince worked mainly internationally with ICL, in a variety of roles from programmer to General Manager. He was in East Africa for 6 years in the 70's, then New Zealand and, in the early 80's in the Caribbean then USA.

On returning to UK he left to act as Technical Director at F International in the mid-80's, one of very few men working at FI in those days. In 1989 he left FI and set up , with other ex-ICL people, a start-up developing applications for large corporates with asset care and maintenance management requirements. This application was based on the Oracle RDBMS. This start-up was sold to Indus International in the early 90s, and Vince joined what is now Thomson Reuters in the Derwent Scientific Publishing division, as CIO. This was Vince's only experience on the "demand" side of the Industry and by 1997 he was ready to get back to the supply side, and he joined a new International Consulting arm set up by Oracle Corporation as a Senior Practice Director. Some more international work then came his way, including Mexico, Venezuela, USA, Spain, Russia, Kazakhstan, Netherlands and Ukraine, and by the time he retired from Oracle in 2012 he had become the Oracle Global expert in Mining and Metals Industries. (based largely on drawing on his experience as a child and teenager in Sheffield).

The Lector & Auto-Lector Optical Mark Machines
by Edd Thomas

It is fair to say that peripherals rarely get as much adoration as the computers they support, but back in late 1963 when English Electric LEO Computers (EELC) released their Lector they were more than happy to announce it as "…the computer users dream come true". Lector was an early Optical Mark Recognition (OMR) machine at a time when such things were the future of efficient data processing. And while IMB and other US companies had got there first with the initial OMR patents and machines, EELC's Lector and Autolector offered a level of versatility that few could rival. Being quick out the gates, Lector would undoubtedly have been one of the first OMR machines produced by a UK company as well. Yet despite the obvious revelry at the time for such a piece of cutting-edge technology, now 55 years down the line very few people have sadly heard of these long-forgotten but ingenious siblings of the mighty LEO computer.

Setting the Scene

Both the typewriter and the Hollerith punch card revolutionised the field of data storage in the early 20th Century, speeding up the output of the humble desk clerk many times over. But while both methods would become the de-facto office tools for many years, there remained the desire and a potential lucrative market for a machine that could completely cut out the middle-man by interpreting human marks itself. This step was viewed as an important jump since typewriters and punch cards both required someone to transfer the data manually onto each machine, but each manual transfer raised the possibility for mistakes and inefficiencies to creep into the system. Of course, while life still turned at the speed of a well-trained human typist this problem remained a largely manageable one, but when electronic computers emerged after the war which could suddenly process data thousands of times faster than any human could input them, the inefficiency gap became painfully obvious.

During the late 1930s IBM had set about creating the first mark sensing machine (IBM 805) predominantly aimed at scoring tests and worked by sensing the electrical conductivity of graphite marks. While it was a great idea in theory the lack of industry take up suggests it was not yet reliable enough for widespread general use. Instead, up to and during the 1950s both optical mark and image sensing technology continued in the developmental stage at research sites like IBM's Poughkeepsie Lab. Initially the development incentive came via support from the affluent banks who were keen to find a means to read and process their hand-written checks quicker as well as from statistical and educational institutions looking to minimize human error, but by the mid-1950s an ever growing number of large businesses (who had purchased their new and expensive electronic Computer and were physically feeling the cost of inefficient data entry) showed that an automatic reader would be a very welcome tool.

Around the mid-1950s IBM did look into a system for recognising 'lakes and bays' on a page (basically white squares with a black border and white squares with an incomplete border which loosely mimicked the look of individual letters) which was an early form of character recognition. But while it reputedly obtained a good degree of accuracy overall, the reader was still not able to match the extremely high level of efficiency which businesses naturally expected. Efforts therefore turned instead to the far easier problem of creating some very basic form of mark recognition. For this an optical solution was found (which perhaps inspired by the simplicity of binary and bits) measured the difference in light sensed between a light and a dark space. It was this system which would become the standard for many early readers including Lector and Autolector.

If the second half of the 1950s was all about the development and refinement of OMR technology, then by the start of the 1960s a slew of new machines and patents were ready for widescale roll out. The first practical mark sense scanner was created by Everett Lindquist for academic test scoring (patent applied for in 1955 and granted in 1962), and the first widespread commercial OMR machine was the IBM 1230 which was granted a patent in 1960 (but filed in 1957). Thus to any spectator at the time, the flurry of activity around OMR must have made it feel like this really was the future. Even the first use of mark-sensing for an election ballot was conducted in 1962, in Kern City, California, using a system developed by the Norden Division of United Aircraft and the City of Los Angeles.

The Lector A402 & Autolector A403 up close

Advert Dec. 1983 in Computer Bulletin.

Courtesy of BSC

Sadly while I have been able to find documents about the mechanical and practical side of Lector, I have yet to find anything which gives an overall background history or timeline to the project or the key engineers involved. Suffice to say as a company who were still on the cutting edge of the Computer industry in the late 1950s and early 1960s EELC would have been aware of the upcoming OMR technology and would have been keen to have tapped into this potential market as soon as they could. Furthermore, as a computer company whose roots had started (and at the time remained) in effective stock management tools, OMR must have seemed like a very natural fit. As an aside, while I would love to know for certain how the Lector name was picked, I suspect that just like the name LEO, LECTOR was probably a clever acronym along the lines of: 'Lyons EleCTric Optical Reader', yet at the same time (by

choice or by chance) 'Lector' is also the Spanish word for 'Reader'.

In the end two versions of the Lector were created which internally used the same reading system but were worlds apart externally. The A402 was the basic Lector model and was intended for small to medium-sized business use. It came with no automatic facilities and was modelled around a regular office desk measuring just 86 inches wide x 40 inches deep x 44 inches high. Admittedly it weighed in at a hefty 508 kg so you wouldn't want to be shuffling it around the office too often, but several Lectors could be easily integrated into most office designs and compared to the giant computers they served, the design was both compact and versatile. It could read between 120,000-200,000 characters per hour which according to their own advertising was 32 times faster than conventional data preparation. It was also proudly advertised as being able to read pencil, pen and biro on a range of paper sizes up to 10"x 8" and could punch onto 5, 7 or 8 hole tape. Since most other machines including Autolector could only read pencil or computer ink, this was an unusual feat. Once processed, the bins could hold around 500 good forms and 150 rejects.

If the basic Lector was intended to help speed things up for a regular business, then the Autolector (A403) in comparison was your new office assistant on steroids. Far larger in both scale and capability, the Autolector came fitted with automatic sorting hoppers and conveyor belts to help maintain optimum efficiency. This was a machine for large-scale industrial use and had been jointly built with Parnell & Sons of Bristol who specialised at the time in high -end shop and aeronautical fitting. Compared to Lector, Autolector could read up to 1,400,000 characters per hour but in either case, both variations still required a separate external paper tape facility (AX400) to actually transfer the data away.

Internally the optical mechanisms in both machines were really the same and its speed was achieved by reading 16 column positions simultaneously. To maintain this efficiency the reader only stopped when there was a line to print, but each line had to be printed independently to prevent data overlap. Whilst reading, a 50msec pulse would physically halt the roller to ensure the sensor didn't erroneously try to read anything in the next column, and while punching a line of data a 1.2sec pulse closed and reset all the flaps ready for the next form.

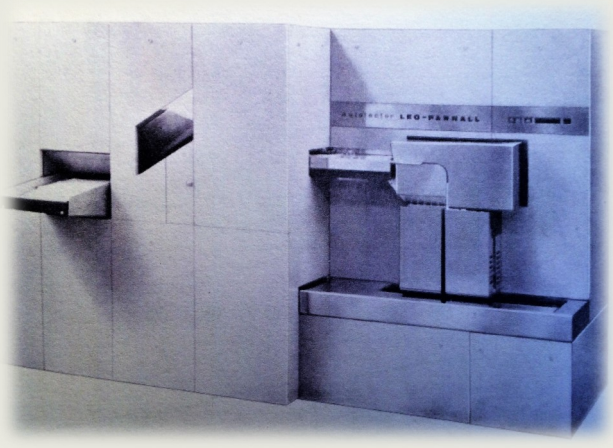
To physically record your data on a form all you needed to do was draw a short line between two points. In the case of mistakes a second line could be drawn directly underneath it which would then void that mark. Since the reader was looking for the difference in light between a white and black spot, the double black line of a fault would technically cancel each other out. To overcome the head-ache of false readings both models were equipped with two level discrimination thereby reading the same marks twice. Any discrepancies between the two sensors would cause an alarm to ring and the machine would auto-punch a 'doubtful' mark on the form ultimately sending it to the reject bin. The length and layout of each form would of course vary depending on its use, so the operator told the machine which parameters to expect using Lector's associated plug board. Combined with an 'end of form' location marker at the bottom of each sheet (two lines which were spaced further apart than normal) Lector was therefore able to tally the lines on each form to sift out other potential rejects.

The Lector Legacy?

Working at optimum capacity both Lector and Autolector should have been very efficient and cost-saving tools for any size of business in the 1960s, however it would be fascinating to know how the engineering and marketing played out in reality?! Sadly, I've yet to find any data about how many Lectors were manufactured nor if any survive to this day. As a general tool Lector and other OMR machines of the time were revolutionary by opening-up the flood gates to the future of impossibly quick data handling. They heralded the end of an era that had been reliant on laborious human inputting and filled the gap between punch cards and the bar code technology that was to emerge in the early 1970s. As the years passed and technology moved on further, OMR would maintain its dominant position within some specialist fields such as mark-checking and electioneering and in time true character recognition software would emerge also. But in the field of stock management OMR would be supplanted by small handheld Remote Terminal Units (RTU) as used by every industry around the world now.

Today Lector and Autolector are both viewed as forgotten technological dinosaurs yet perhaps they do deserve a more favourable epitaph. While neither were the first of their kind to appear, the sheer brutal efficiency of Autolector is commendable, as was both of their ability to be used alongside any mainframe computer (not just those of their parent company like so many others at the time). For Lector in particular, there were also the early inklings of things to come. Granted this was not a portable machine in any modern sense of the word, but as an autonomous and small-ish item it gave the computer the chance to stretch far out beyond head-office into the edges of the business. Lector's presence handed new responsibility to the factory floor worker yet usurped power from the pool of office staff who had previously and zealously guarded the path to the mighty computer. And we have never looked back since.

Notes on Edd Thomas:- Edd runs a small online business from Wiltshire dealing, collecting and writing about historically significant vintage and retro technology.



Autolector

Update on the HLF Project

By Lisa McGerty, Project Manager at the Centre for Computing History

The project started in earnest in October 2018 and since then our focus has been on four areas: publicising the project (and LEO!), recruiting a new archivist to work at CCH solely on the project, moving documentation and other artefacts held by the Society to CCH and planning how to move forward with the wonderful resource that is LEOpedia.

When news of the Lottery award was first made public, it created quite a stir. It was extremely gratifying to see organisations like the BBC covering LEO in the 21st Century, both on their website and on TV. Their access to historical Pathe footage relating to Lyons really set the scene for telling the story of LEO. I enjoyed many a conversation at the time with people who had no idea that a mass caterer had developed the first business computer.

The press coverage really helped us get a good quality set of applications for the new Archivist post we are creating as part of the project. Jude Brimmer, a qualified and experienced archivist, starts in the role in mid-January. Jude will bring much needed skills in looking after paper-based heritage to the project along with a passion for preserving twentieth century collections and her enthusiasm for LEO was obvious even at her interview. We're hoping that Jude will attend the Reunion in April, so hopefully you can meet her there and talk to her about her work.

A good number of LEO documents are already being stored at CCH, ready for Jude to start working on. Of particular note are David Caminer's papers and Peter Bird's. Jude will start by surveying the material to assess its physical state and identify any papers that are particularly at risk of deterioration. Along with volunteers and myself, she will then catalogue and digitise the documents, move them into safe storage and, hopefully, we will be able to cross-reference them so that a more detailed and comprehensive story about LEO, its achievements and its legacies, can be built up. We will also seek to create a real buzz around LEO using the documentation, by slowly releasing details to the public through the internet, social media and displays and events at CCH. We're all determined to get LEO more of the public recognition it deserves!

We do need more material for Jude to work on though, so if you have memorabilia that you'd like to see preserved for posterity, and you haven't already told the Society, please let Hilary Caminer know. Or if you have memories to share, don't hesitate to get in touch. At CCH we strongly feel that, important though physical heritage is, it is the lived experience of something that really brings it alive for audiences of all ages.

The final focus for these earliest weeks of the project has been LEOpedia. This really is fantastic resource for anyone interested in LEO; at CCH we are keen to broaden its use even further by developing it as a hub for all things LEO and, with Frank land, we're working on this now. The new, fully searchable web-based LEOpedia will be available soon. In addition, in December Frank was kind enough to be interviewed on camera about his memories of LEO and we're hoping to make this video available soon too.

Watch this space!

Press Releases

Here are some snippets from the original Press Release on the Heritage Lottery Funding (HLF) for our joint project with the Cambridge Centre for Computing History, followed by an update on the project progress.

The Centre for Computing History and LEO Computers Society win Heritage Lottery Fund support

The Centre for Computing History and the LEO Computers Society are delighted to announce that we have been awarded a £101,000 development grant from the Heritage Lottery Fund (HLF)* for Swiss Rolls, Tea and the Electronic Office: A History of LEO, the First Business Computer. Made possible by National Lottery players, the project aims to bring together, preserve, archive and digitise a range of LEO Computers artefacts, documents and personal memories to share the fascinating, yet largely unknown, story of LEO with a new audience. The development grant will enable us to progress our plans to apply for a full National Lottery grant at a later date.

Centre for Computing History

Established in 2006, the Centre for Computing History is a charitable heritage organisation with a strong focus on learning. Since opening in Cambridge in August 2013, the Centre has helped people understand how tech has shaped the modern world and revolutionised the way we live, work and play through interactive displays and exhibitions, our schools programme, learning events and workshops, and an astonishing collection of computers old and new.

Visit: *www.computinghistory.org.uk.*

Notes on Lisa McGerty

Dr Lisa McGerty was one of the founding trustees of the Centre for Computing History, Cambridge and is currently employed as its finance officer. She has an academic interest in the social impact of computing and a personal passion for LEO computers. She curated an exhibition on LEO in November 2017. Following the submission of our successful Heritage Lottery Fund application, Lisa is now leading work on the LEO heritage project at CCH with the Society, helping to unlock the stories within what she is sure will become a unique archive.

BREAKING NEWS

"LEO and THE MANAGERS" John Simmons 1962 Book

By Graham Briscoe

Back in January 2017 I had an initial email discussion with Peter Byford on the possibility of formally re-printing, within the LEO Computers Society and the CCS Resurrection journal, the two diagrams of the LEO III master systems plan for J Lyons company that John Simmons had developed for his 1962 book - LEO AND THE MANAGERS, published by Macdonald, London. I had used them in my contribution to the "Peter Bird memorial booklet". Email discussions then followed for the remainder of the year with a number of colleagues across the BCS / LEO Computers Society / CCS Resurrection on the legal aspects of formally reprinting them, together with further full narrative extracts from John Simmons book, in the LEO Computers Society e-newsletter and the CCS Resurrection journal.

There was considerable debate, and differing points of view, about the legality of such an action. Peter Byford then attempted to trace the take-over history of Macdonald publishers and had "got lost" within the Hachette Group of companies in the USA! We both tried personal contacts in the States to follow through, but both of us got nowhere new.

Back in January 2018, not willing to be defeated in this quest, and having the time, energy and inclination to undertake the appropriate company heritage research on both sides of the Atlantic, I went back to basics and started again using forensic research techniques. Following being bounced electronically backwards and forwards many times across the Atlantic over a nine-month period with the USA Hachette Book Group (part of Hachette France) - I picked up a USA contact that led me to the UK based London offices of Little Brown publishers (a publishing company within Hachette UK - owned by Hachette France).

You can imagine my extreme surprise when I finally spoke to the Little Brown "Permissions Department" in London, and after explaining what I was seeking - I was advised that in their Little Brown company heritage records they were still holding the original contract from 1962 that the J Lyons Company signed with them at the time the book was published. Whilst John Simmons held the copyright, J Lyons company held the publishing rights, and it was these rights the LEO Computers Society were seeking.

So - another search commenced - and a "new" J Lyons company was found - whose registration records went back to the original J Lyons head office building address (Cadby Hall) which was the address on the original 1962 Little Brown "Publishing Rights" contract with J Lyons. Originally the purpose of this "new" J Lyons company was an investment holding company after the Allied Domecq acquisition in 2005, and finally a Dormant Company within the Pernod Ricard Group. Further heritage information on this new J Lyons company can be found at Companies House:-

https://beta.companieshouse.gov.uk/company/00040901

In the Company House records linked above is a copy of the original J Lyons "Articles of Incorporation" from the 10th April 1894, along with copies of other heritage J Lyons company documents and Annual Accounts.

But - back to John Simmons book. Further investigative research identified a Director of this dormant "J Lyons" Pernod Ricard company - currently a Director of Chivas Brothers - a Scottish distillery within the Pernod Ricard Group. Chivas Brothers has its headquarters in Paisley, near Glasgow, and operates 14 Scottish malt distilleries, all located in the Speyside area – apart from Scapa on Orkney – along with Strathclyde grain distillery in Glasgow. It also owns gin distilleries in London and Plymouth, and blending, bottling and warehousing facilities at several sites across Scotland. In total the company employs 1,600 people at 34 locations. Contact was made, the transfer of the book`s "Publishing Rights" to the Leo Computers Society agreed, and the rest, as they say, is history.

There are two elements to the transfer of the book`s "Publishing Rights" and both of the transfer letters are now part of the LEO heritage with the LEO Computers Society formal records. The first is the transfer by Little Brown Publishing to the " new" J Lyons Company, and the second is the onward transfer of the "Publishing Rights" to the LEO Computers Society.

One last "little" job for me still outstanding (to close the circle) - is to approach Little Brown Publishers to see if I can persuade them to donate the 1962 original "Publishing Rights" contract with J Lyons to be deposited in the LEO Computers Society heritage archives.

Notes on Graham Briscoe

Graham is a Chartered Engineer, Chartered Information Technology Professional, a Certified Management Consultant and a Fellow of the British Institute of Workplace and Facilities Management.

He has worked in many management services roles throughout his thirty year corporate career with Royal Sun Alliance (RSA-Phoenix / Sun Alliance / RSA) in London, Horsham, Liverpool and Bristol encompassing - project and change management, information technology, quality and customer service management, transformational change and office and work relocations associated with mergers and acquisitions.

Since 2005 following his early retirement he has built up a portfolio of "Community Investment" involvement, including Further Education College Governance at Weston College and Bath College, a visiting Fellowship and Lectureships at a number of Universities, Housing Association Non – Executive Directorships at Curo in Bath and Homes in Sedgemoor in Bridgwater, Charity Trustee appointments - Chair of St Mary Redcliffe Parish Charity and past Trustee of The Harbour, Circomedia and CAB in Bristol, and Professional Institute Governance – he was a Board Non-Executive Director of the British Institute of Facilities Management and he Chaired the Board`s Audit Committee.

He also provides pro-bono "Change Management and Facilities Management" support to Charity, Voluntary and "Not for Profit" organisations in the South West and south east Wales. Finally, he was appointed in 2015 as an elected member of the Governors` Council at Bristol University Hospital representing North Somerset.

A Virtual LEO
By Alan Cooper

LOLA (London On-Line Local Authorities) was a computer consortium formed in 1970 of four London boroughs – Hackney, Haringey, Hillingdon and Tower Hamlets.

Previously, Hackney and Tower Hamlets already shared a LEO III computer and LOLA eventually took over the LEO workload, some of it run on LOLA's IBM computer using emulation.

In January 1969 the London Boroughs Management Services Unit published an 118-page book entitled Report on the initial study: London borough of Haringey long term computer project – dubbed internally as the Yellow Report on account of its colour. It envisaged a central database of citizens' data providing a 360 degree view of all the services provided to each of them, all accessible via VDUs and updated in real time. This was an era when most organisations were using batch updating with punch card input, magnetic tape for data storage, and paper output.

It was clear that the scale of investment was well beyond the means of one London borough. It was estimated that the computer hardware would cost about £1 million (about £16m today) and that the system development work, for what were then identified as the basic 'nucleus' computer applications, would involve at least 80 man-years.

The solution was a consortium of Local Authorities. There already existed a North-East London Computer Scheme, a consortium set up by Hackney and Tower Hamlets in 1966. This consortium had made rapid progress using a LEO III installed in a converted factory in Hackney, and standardised programs developed by the London Boroughs Management Services Unit (LBMSU) for the London Boroughs Joint Computer Committee (Bexley, Greenwich and Southwark).

Unfortunately three authorities were still not enough to show a clear-cut cost justification of the new proposals. This was particularly so because of the extremely modest level of existing costs for the LEO III of a second-hand central processor that had no development element.

Formation of LOLA

Further progress became possible when, early in 1970, Hillingdon expressed an interest in joining the proposed consortium and in March 1970 the London On-Line Local Authorities (LOLA) consortium was created. It would handle the processing for 900,000 citizens and 300,000 properties, representing 11.5% of the geographical area of Greater London.

Revolutionary Design

The Yellow Report did address the question of further enhancing the LEO III but discounted this due to: 1) the need for telecommunication links and 2) a massive data capacity all accessible within a fraction of a second. It said "these two features are revolutionary".
Massive was defined as 300MB per London Borough for the Nucleus.

The provision of ad-hoc management information requests in a timely manner was seen as essential, allowing senior officers to direct the efforts of their staff as needs and priorities changed. At an executive level, data analysis ("big data" in to-days parlance) would be used to guide council strategic policy decisions.

All these operational, management and strategic requirements necessitated a computer system able to immediately access and update a large data store and to multi-task numerous users simultaneously. Indeed, the report saw no limits in computing capability, rather the limits were in people's ability to think out their requirements.

The Nucleus covered Rates (council tax), Billing (for council chargeable services), Council Tenants (including rents and housing allocation), Educational Grants, Staff Management and Payroll, Creditors and Stock Control, Job Management and Costing (for properties and highways), and Accounting and Budgetary Control.

A later Extensions phase envisaged Land Management (including location, size, condition and much more), Commercial Property (including leases, inspections, licences and again much more), Land Registry (ownership and planning applications), Electoral Roll (voting and jury service), Citizen Surveys (linked to census data), Education (pupils and teachers), Social Services, Health Services, Births, Marriages & Deaths. Data storage would increase by 8 times to support these extensions and again all accessible and updatable in real -time within each department.

Lack of time precluded investigating all of the council's requirements but the report saw no reason why areas such as Library Management, Engineering & Architectural Design and

Project Management could not also be computerised.

Whilst the report stopped short of recording every citizen it would in reality approach this as it envisaged holding data on every citizen that interacted with the council in some way, cross linking citizens (e.g. spouses and children) and supporting them from cradle to grave.

IBM and IMS

After extensive hardware and software evaluation an order was placed in July 1971 with IBM for delivery of a 360/50 computer with 512K bytes of main store and two 9-drive disk units (each of 236 million bytes nominal capacity). A major factor influencing this decision was IBM's then new advanced data base and telecommunications package – Information Management System (IMS). In fact LOLA and Standard Life in Scotland would be the first in the UK, if not Europe, to use IMS.

Getting Operational

A large modern office block was found at Enfield and in August 1971 the 360/50 was commissioned. The staff then comprising the computer division of the LBMSU moved over en bloc from Victoria on 1 October 1971 and were formally transferred to the employment of the new joint committee one year later.

The first application was an on-line rating system (council tax). It was also the foundation of the new property and people data bases to which further data and applications would link. Applications were written in PL/1.

As IMS was new, LOLA had a “hot line” to the developers in San Jose, California. When the IBM developers first saw the proposed database design they were shocked at the complexity, having far more data elements and relationships that the development site at Rockwell. [Rockwell had won the bid to build the spacecraft for the Apollo program and with IBM developed IMS to handle parts inventory for the Saturn V rocket, going live in 1968.]

These initial USA applications used the natural hierarchical nature of IMS but LOLA implemented multiple and linked very flat physical databases. This gave more of a networked architecture that was better suited to implementing a 360 degree view of all citizens and services.

Nevertheless, despite the complexity, IMS software bugs, data corruption, no available training courses and draft manuals, plus all the problems with power problems arising from the miner's strike, LOLA went live for Hackney in April 1972. Hackney and Tower Hamlets followed in October and Hillingdon in March 1973. Phase 2 applications in 1973/74 included Financial Management, covering accountancy and budgetary control.

A Virtual Leo

The LEO III, which had been running since December 1966, closed down by the end of the 1973/74 financial year. This was achieved by using an package written by IBM to emulate the remaining LEO programs as an interim measure until their complete super-session by the on-line facilities. One of the emulated applications was payroll.

Growth

In due course the LOLA computer was upgraded in August 1973 with a new IBM (370/158 with one megabyte of main storage and the large-scale 3330 disc storage units.

Despite the early teething difficulties the initial system met its functional requirements. By 1977 further applications had been developed and the number of terminal had grown to 112 in council offices spread across North London.

Notes on Alan Cooper

Alan Cooper was at LOLA from the start in 1970 until 1975. Working in the Applications Support team, he was responsible for database design and maintenance as well as creating middleware to support the application developers. This article uses material from a contemporary article written by Derek Schartau, the Director of LOLA for many years.

Alan started his career at Barclays Bank as a programmer and then moved to similar role at IBM. After LOLA he undertook a DBA role at the Danish Bank in Copenhagen. On returning to the UK he joined the embryonic TSB Trust Company, the insurance and investment division of the TSB Group. Here he undertook a wide range of IT Strategy & Planning and Business Development roles. This was followed by 20 years as a Management Consultant with a focus on major procurements in central and local government, particularly highways. He is now retired and dabbling with home automation.

LEO LIVES!
LEO DME, Another story.....
By Tony Morgan

Following on from my previous article ‘Commissioning LEO IIIs’, I was due to spend a year in the USA accepting twenty RCA Spectra 70/45s. My US visa was granted, but, at the last minute, the order was halved and the English Electric side of the company already had a resident engineer to work between Philadelphia and West Palm Beach. When Doug Comish and Ninian Eadie failed to persuade me to go to Winsford to commission the five new LEO 326’s for the PO I followed up Mike Gifford’s recommendation that commissioning engineers would be good in product planning. David Caminer sponsored me to do consultancy training for

experience in sales at no reduction in salary. At the first lecture at Radley House Colin Lewry came in and pointed to me and told me I could go to sleep for three days during the hardware appreciation periods. I did actually contribute at times.

Briefly I worked on production control at Computer House but after the creation of ICL, I had an interesting interlude with West End Area sales including the wonderful Harrods 4/50 account working out of 88, High Holborn. Then the job I'd been hoping for came up at ICL HQ Putney, System 4 product planning. I did 4/62, 4/52, elements of 2903 including the VDU control console. OPER 2 for 2900 and the 1902/3F's with semi-conductor store. After 3 years in Product Planning, (the department in that period was cut back by a third and then a half over three years. I was the new kid on the block so I must have been doing something right), we were told to seek new employment within the company as product planning was being devolved to the development divisions. I already had an application in to transfer to the Customer Satisfaction Centre in Government and Public Services Division of sales. While there I was asked if I knew anything about LEOs. I spent six months at Post Office. Kensington, ten years after I'd managed the two LEO 326's in there, getting them back within the six month rolling maintenance contract. Tape compatibility, spares problems and watered-down expertise there were the major problems.

Whilst there, John Yeomans, PO Sales regional manager, offered me the job of coordinating LEO, System 4 and 2900 contacts around the country. Here I received the planned transfer of telephone billing to 2900 from the PO. After the hardware performance and software facilities problems with 2900 had been solved, suddenly the transfer of telephone billing from LEO to 2900 shifted two years into the future. They had decided that design of the New Billing System needed to be redone from scratch. This meant our engineers who'd already missed out on transferring to System 4 were seeing 2900 pass them by. I alerted Jim Lessey, now the regional sales manager, that keeping the LEOs going was no longer ICL's problem, the performance facilities problems on 2900 having been solved. A top level meeting was immediately set up with Jim Moody, the managing director of Post Office Data Processing Services. I first met him when I installed III/90 at Charles House, Kensington, where he was then deputy manager.

At this meeting various options were discussed including doing sorting and printing on System 4, transferring tapes between the two system types using the Standard Interface Assemblers (SIA) which connected System 4 tape decks and printers to the LEOs, This was seen to be, not only time consuming but logistically unwieldy, due to the location around the country of the two machine types. I floated the idea of emulating LEO on 2900. This had already been done for 1900 and System 4 for the transition of existing customers by ICL, Dalkeith. A feasibility was study was set up. 2960 and LEO were both microprogrammed machines and I provided Ron Aichison and Bert Hutchins, the micro-programmers at Dalkeith with the LEO microprogram charts for guidance. As a result of the study it was agreed that the implementation would go ahead with three main planks.

1. Purchase of a 2960 for trials in a new office building at Llanishen, near Cardiff.
2. The recruitment and training of twenty new LEO engineers to allow our existing engineers to move on.
3. The purchase of strategic spares to cover the next two years. This particularly covered magnetic tape heads and print barrels, both of which wore out and were very expensive to purchase from Ampex, Potter and Anelex in the States. By this time the PO LEOs were the only users. (Concorde presented similar problems in later years).

The first meeting of the DME / LEO 326 Progress Meetings took place in April 1979. The project was priced at one and a quarter million pounds with an eighteen month timescale. I did miss the next meeting as I was on my first trip to New Orleans for the annual jazz festival. By the fourth meeting in June 1979 the project had been approved by the PO Board. By September 1979 Peter Nash had been appointed ICL's full-time Project Manager.

By the beginning of 1980 training of the twenty newly recruited engineers in two batches was underway. I was appointed to do the training at PO Kensington, giving three of the four lectures a day and scheduling other experienced field engineering staff for the fourth period to cover other relevant aspects like test programs, Master Routine software and dumps. Fortunately I had gained some experience giving training courses for engineers from all PO centres to refresh and improve their knowledge back in 1965. I was able to get the functional drawings put on microfiche by the training school at Letchworth so that sets could be used by each student.

On the spares front four-monthly reviews were set up with Spares Division. I got top-ten spares problem lists from each site and collated them and sent them to Sydenham in advance. What came light was unsatisfactory quality with second sourcing for cost reasons and inadequate tolerancing of mechanical spares. Spares got me to expand the survey to System 4 and 2900 because of the PO's spread of systems.

In preparation the microcode testing at Dalkeith I got Colin Hiscock, a field engineer with excellent software knowledge, to put the six LEO test programs on an industry compatible tape. Both 1900 and System 4 microcode had been debugged using the respective operating systems (George and J), hardly an easy approach. When I heard Dalkeith had thrown the Master Routine at the LEO code, I immediately flew up to Edinburgh with Colin, the tape, the test program manuals in two carrier bags and Dick Etherington, an experienced LEO hardware support engineer. Trials were at two o'clock each afternoon. At the first session the Dalkeith patch passed point and led to a dump at the new failure point. We then ran T8, the first of two simple arithmetic programs and got a dump, explaining the failure from the manuals. The next day both patches passed point and we also ran T9, the second simple arithmetic program, and got a third dump. By the end of the week all six test programs ran, including floating point, double-length arithmetic and the complicated LEO data handling actions. And the Master Routine loaded! Testing then went ahead of the input/output routines. The code for this had been taken from System 4 DME because LEO used the SIA and System 4 peripherals.

The next stage was full acceptance testing on the 2960 in Cardiff. Peter Nash announced he had acquired the services of

an experienced LEO III operator to conduct the trials. When I asked for his name it turned out to be Brian Norris, who had been one of our commissioning operator team leaders at Minerva Road. John Daines knows him well. Brian was the fastest LEO operator in the world. (During LEO acceptance trials, Brian would have a rerun going before the observers realised there had been a failure. We, of course, would take any now reduced penalty, but then account for the failure). Brian also raced his MGB and appeared on the front of the MG Car Club magazine going off backwards into the undergrowth at Brands Hatch. After he left Minerva Road I heard he had sustained severe burns when testing his Formula V car at Silverstone. I visited him in Stoke Mandeville Hospital. When we met up for the DME trials I could see the skin grafts on the back of one hand had never concealed the damage completely. I became his assistant operator during the trials. Release 1 was accepted one day ahead of the original target on 5/1/81. Subsequently we installed it at Portsmouth and Kensington.

The project came in on time and on budget. In the end it was only really an insurance policy by the PO. However it was used in anger at Cardiff for the last two telephone areas to be transferred when the Cardiff LEO III/44 failed catastrophically.

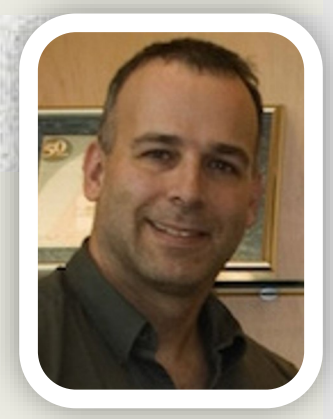
LEO LIVED!

As a postscript, I represented ICL at the official switch off of the last LEO 326. This was at Derby with Jim Moody representing PO/BT. With Telephone Billing running, and after the typewriter typed out 'Good bye LEO' with a specially written program, Jim pressed the Emergency Stop button. In the ensuing silence there were explosions around the computer room and it filled with smoke. The engineers had wired in PO smoke bombs used for testing underground ducts!

Notes on Tony Morgan

Tony first served on the LEO Computers Society committee 20 years ago. His current role is to identify and explain the LEO hardware artefacts which are received or discovered by the Society. He has been keen to ensure that LEO's history is preserved and generously provided the funds allowing the Society to erect both a commemorative plaque and an Information Board in Lyons Walk, next to where Cadby Hall once stood.

Update from the USA
By Dag Spicer



The Computer History Museum (CHM) is home to the world's largest collection of computers and computing-related objects. With over 100,000 individual items in its permanent collection, the Museum provides the world with a comprehensive record of the creative and vibrant material culture of computing combined with award-winning interpretive skills. At our Shustek research centre, we have over half a linear mile of documentation and thousands of pieces of evocative ephemera like t-shirts, posters, and buttons to inform, contextualize, and 'round out' public exhibitions of the main objects.

Connecting these objects to contemporary culture is central to 'meeting people where they are' and making these oftentimes ancient and opaque objects meaningful to today's visitor. CHM offers something for every age – from eight to eighty. Multiple layers of interpretive detail – from short labels to in-depth oral histories -- are available within the exhibit to accommodate varying level of interest for adult visitors. For those of school age, a sophisticated series of programs and activities by our Education Department keep the Museum sounding busy with the hum of laughing children, who learn programming, 'engineering thinking,' how to interpret technology historically, and how to make connections between today's and yesterday's devices and machines, understanding the benefits and limitations of each.

Offering visitors a glimpse into what an actual computer room looked like and how it functioned in the early 1960s, the Museum maintains and demonstrates two working computer systems from that time: a DEC PDP-1 Programmed Data Processor, and an IBM 1401 Data Processing System. These two systems represent competing styles of computing then becoming apparent, notably single-user systems vs batch mode systems. Both are iconic of their time: the PDP-1, with its interactive real-time high-resolution display could be used for sophisticated programming tasks and simulations. The 1401 was more business (accounting and payroll) oriented and also IBM's first effort to move its punched card ("unit record") customers from a plugboard oriented programming system to a stored program concept, in which data and instructions were both stored in memory for maximum use of the electronic speeds then becoming available. In 1965, over half of all installed computers in the world were IBM 1401s so our display, which took volunteers a decade to bring back to life, is truly canonical of one of the highest periods of computer growth in history.

LEO holds a special place in our hearts, being quite possibly the world's earliest commercial electronic stored program computer. The links between LEO people and the Museum go back to at least ago over thirty years when LEO Chief Engineer John Pinkerton visited the Museum on October 4th, 1987. We are searching our archives at this moment to determine if there is a recording of his talk – which was about the use and design of the LEO I. I will update the Society on the status of this recording in the next newsletter.

Most visitors will encounter our LEO story in the "Early Computer Companies" gallery of our main exhibition, Revolution: The First 2,000 Years of Computing. The LEO story is also described via a video of "The Leo Film" on one of Revolution's multiple 'personal viewing stations' -- video kiosks in front of each gallery with vintage footage of the key people behind the inventions in that gallery.

In 2009, CHM attended an auction at Bonham's and purchased several LEO items there so that it could better tell

the LEO story in our main exhibit. The "LEO II paper tape reader control" panel and the "LEO II main console display tube" comprise the two main objects on display there, combined with a reader rail. You can see the items purchased, originally from the Michael Bennett-Levy collection, here:-

https://www.computerhistory.org/collections/search/?s=X5594.2010

Online, the LEO Story, in short, exhibit-style form, is covered in "From Cambridge to Café":-

https://www.computerhistory.org/revolution/early-computer-companies/5/110

And a complete listing our of our LEO objects:-

https://www.computerhistory.org/collections/search/?s=leo

I invite anyone from the Society who would like to visit the Museum to do so, as my guest, anytime they are able to make the trip.

Notes on Dag Spicer

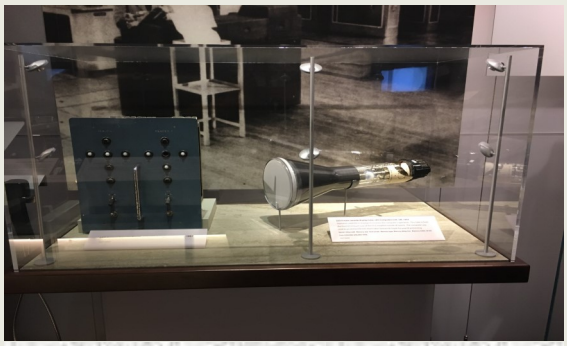
Dag Spicer is the Computer History Museum's "Chief Content Officer" and the LEO correspondent USA. He is responsible for creating the Museum's various programs and exhibitions. He also leads the Museum's strategic direction — it is the largest collection of computers and related materials in the world.

Dag is both a graduate and post graduate of the University of Toronto and Stanford University. Prior to joining the Museum, he spent a decade as a digital circuit designer, eventually founding two successful companies. He is on the Editorial Board of the IEEE Annals for the History of Computing and is a member of the American Historical Association (AHA), the Society for the History of Technology (SHOT), and the American Association for the History of Medicine.

He volunteers at Stanford University Medical Center in the Department of Surgery and has a lifelong interest in internal medicine, surgical techniques, and the disciplinary foundations and history of medicine. His hobbies include swimming, hockey, computer architecture, limnology, and Cycladic art.

Museum founder Gwen Bell with John Pinkerton at the Museum (in Boston), October 4, 1987.

Computer History Museum, Mountain View, California



LEO II paper tape reader control panel and the LEO II main console display tube.

Computer History Museum, Mountain View, California

LEO II main console display tube, LEO Computers, UK, 1957

Operators used these displays to monitor the computer's operation. This tube is from the third LEO II built (one of the first installed outside of Lyons). The computer was used by prominent British steelmaker Stewart and Lloyds for payroll processing.

Speed: 340uS/add
Memory: 1024 39-bit words (Hg Delay Line)
Cost: £90,000 in 1958

Computer History Museum, Mountain View, California

LEO COMPUTERS SOCIETY ON SOCIAL MEDIA

The Society has had a twitter account ***"@Leocomputers51"*** for some time, we now have an Instagram account "***Leocomputerssociety***".

If you use these Social media please check out our account. New member Edd Thomas is managing our Social media and will update them when he can. Please retweet our messages and do whatever the equivalent of retweeting is for Instagram.

COMMITTEE

Peter Byford	Chairman
Frank Land	Chair History Sub-committee
Hilary Caminer	Secretary
Bernard Behr	Treasurer
Gloria Guy	Merchandise
John Daines	Talks & Marketing
John Paschoud	Legal & Constitutional Matters
Mike Storey	Reunion Planning
Mike Tyzack	Oral History
Ralph Land	History & Fundraising
Tony Morgan	Technical Consultant
Vince Bodsworth	TNMOC Rep., Heritage Project & Membership
Bob Stevenson	Website Manager

Co-opted Members

Lisa McGerty	CCH Representative
Elisabetta Mori	PhD Researcher
John Aeberhard	PR Consultant

In addition we have a number of volunteers who are helping with the history projects. Our recruitment of new members is mainly by way of our website. We now have over 800 members around the globe.

www.leo-computers.org.uk
newsletter@leo-computers.org.uk

Published by LEO Computers Society

STOP PRESS

The LEO Computers Society are proud to announce that we have achieved Charitable status. I would like to thank John Paschoud for his efforts to in preparing the original application last Summer and fielding the detailed questions we had from the Charity Commission.

We are now a Charitable Incorporated Organisation (CIO).

This is not the end of the Charity process of course and you will hear more from us regarding the changes that we will make to abide by the rules as a charity.

Peter Byford
Trustee
LEO Computers Society

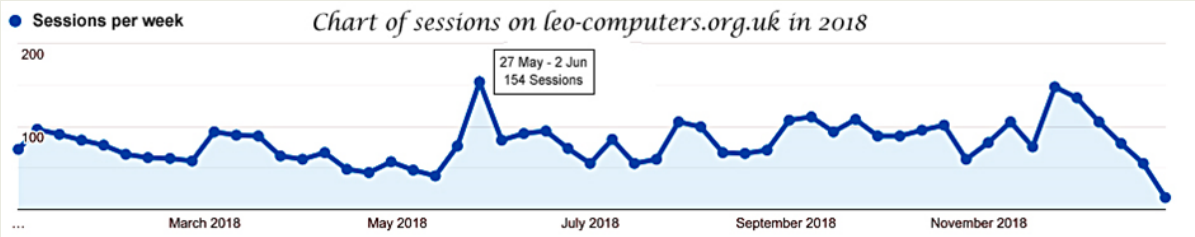
The statement by the Charity Commission is as follows:

We are satisfied that LEO COMPUTERS SOCIETY is a charity and it has been entered onto the Register of Charities with the Registered Charity Number 1182253.

Our decision.

The decision to register was based on our assessment of the information supplied during the application process and the declarations given in the trustee declaration form and we are satisfied that LEO COMPUTERS SOCIETY is established for charitable purposes only for the public benefit.

WEB STATS provided by Bob Stevenson



Interesting Observations

1. The total number of sessions in 2018 was an improvement on 2017 – 4295 to 4053.
2. The highest number in a week was 154 at the end of May.
3. Friday 6 July was the one day in the year with no visits at all.
4. Although South Korea was 5th in the list of countries with the most visits, all 81 sessions visited 1 initial page for a total time of zero. The most prolific of these cities was Muju-gun, (38 visits), a popular tourist area but not known as a hacking area, which was my first guess.

	Country	Sessions
1.	United Kingdom	2,692
2.	United States	360
3.	France	330
4.	Australia	82
5.	South Korea	81
6.	Ireland	58
7.	Spain	48
8.	Canada	47
9.	Germany	42
10.	Japan	40

Visits to the LEO Website by Country

	City	Sessions
1.	London	578
2.	(not set)	375
3.	Paris	306
4.	Luton	174
5.	Epsom	109
6.	Hemel Hempstead	108
7.	Teddington	80
8.	Bagshot	74
9.	Ware	54
10.	Wembley	49

Visits to the LEO Website by City

	Operating System	Sessions
1.	Windows	2,742
2.	iOS	488
3.	Android	458
4.	Macintosh	409
5.	Linux	110
6.	(not set)	47
7.	Chrome OS	39
8.	FreeBSD	1
9.	Windows Phone	1

Visits to the LEO Website by Operating System

	Browser	Sessions
1.	Chrome	2,006
2.	Edge	654
3.	Firefox	619
4.	Safari	568
5.	Internet Explorer	243
6.	Mozilla Compatible Agent	66
7.	Samsung Internet	44
8.	Opera	33
9.	Safari (in-app)	30
10.	Android Webview	9

Visits to the LEO Website by Browser