LEO MATTERS

May 2025 Vol. 17

Edited by Hilary Caminer

Chair's foreword

This is very sadly Hilary Caminer's last edition of *LEO Matters* as she retires from being our excellent secretary/newsletter editor/minutes secretary in June. We have proved just how much she has been doing for us by recruiting 2 or possibly three people to fill the huge gap that she will leave. I hope we can still be able to call upon her in the future as an advisor.

This is an opportune time to say that we need more volunteers to help us with various activities, particularly to help with publicising the LEO story through education and museums. We may even be able pay, perhaps, someone to carry out some research for us.

I would also like to bring to your attention new publicity for the LEO story. If you happen to be near the site of the former Lyons' HQ, Cadby Hall, you will see hoardings that tell the LEO story in a timeline and photos around the new development of the building, now known as "66 Hammersmith Road".

November 2026 will be the 75th anniversary of the time when there was only one computer in the World working on business applications, LEO 1. We intend to have a special event to commemorate this. I would welcome any suggestions for how we might celebrate this historic occasion.

Turning to the content of this edition of *LEO Matters*. For Hilary's "swansong" we have one of the busiest newsletters of her tenure. As usual this issue contains both news of the Society's recent activities and some more memories of work with LEO. We also invite your contributions to an ongoing research project.

Hilary starts this issue by looking back over her time in the role. Since our last edition, we are delighted to be able to report that work on the LEO archive at CCH is now continuing thanks to a generous grant from the AIT Trust. Lisa McGerty and our new Land archivist Kate Stockwell tell you about their work.

Elisabetta Mori, describes her varied activities since she gained a doctorate for her researches into LEO in 2022. Her account shows just how busy she has been.

Next, Eric Dickens reports on the interesting project that he and a team of enthusiastic volunteers have developed to demonstrate how the CLEO code worked on Premium Bond programs.

A new departure for the newsletter is the piece written by Professor Simon Lavington researching women programmers in the very early days - up to 1959. He gives us his findings so far and then invites readers to contact him with any information they may have. He would be very grateful for as much information as you can give him.

We are still collecting reminiscences of time working on LEO and we include two contrasting pieces. The first is a vivid account by John Hall of his time as an operator on II/5 at Hartree House and the second a memory of a brief encounter with LEO III at Minerva Road by Leon Heller when he was an EELM engineering apprentice. Please - if you haven't yet written reminiscence, do think about writing one. They all get preserved in our archives and contribute to the rich source material available to all about LEO.

Our final article is a piece in memory of Bill Sant who worked as a programmer and manager on LEO III/9 at Customs and Excise in Southend. Bill died in January, aged 90.

The issue finishes with a list of books you can buy from us and details of our trustees and committee members.

May I remind you that our AGM is coming up - via zoom - on Monday, June 9th at 17.00 BST. We hope to see you there. Please, if you are interested in getting more actively involved in our work, do contact me.

About Peter Byford

Peter started work as a programmer on LEO III/1 at Hartree House in 1961 where he remained until 1965. He went on to a long career in IT at various companies including 25 years at British Gas-Eastern. He writes: 'I became involved with LEO reunions and, in 1981, their organiser 'passed the baton' on to me. The LEO Reunion Society (later LEO Computers Society) was formed and despite many committee changes, no one has yet volunteered to take over as chairman. I have had excellent committee members (now trustees) over the years: I am just a figurehead touching the tiller from time to time!'

Hilary is signing off as editor….

This is the thirteenth (lucky number?) edition of the society's twice yearly newsletter, now named *LEO Matters* that I have had the pleasure of editing. My first was in 2018 a couple of years after I joined the committee and became the Society's secretary. This issue is to be my last as I am standing down for personal reasons. Fortunately, we have a new editor-in-waiting – more about that at the end of the article.

Now, nostalgia time - here is a whistle-stop review of some of the many items I have included in my time as editor – they show what a very busy few years the Society has had and some may jog your memory . I believe that taken as a whole, our newsletters provide a useful chronicle of our news, views and histories. Incidentally, all the back numbers are available for you to read on our website at https://www.leo-computers.org.uk/newsletters/

Lots to celebrate

There have been some great moments to record – for example our success in winning lottery funding for our major heritage project which we ran with our partners at the Centre for Computing History, Cambridge. We noted with delight the awards won by the LEO film and the Virtual LEO I. And it's good to be able to report in this current issue that we now have a new archivist working at CCH in a post called The Land Archivist generously funded by the AIT Trust.

We celebrated Frank Land's much-deserved award of an OBE and there was more good news in the awarding of a doctorate from Middlesex University to Elisabetta Mori for her thesis on LEO supported by funding from the AIT Trust and named in honour of David Caminer, another LEO pioneer.

On the 70th anniversary of LEO's first starting work in earnest -in November 1951 – we were honoured to be able to print a message from Queen Elizabeth who had, as a Princess been shown the still-being-perfected LEO I some 9 months earlier.

We reported on the LEO talks given by Neville Lyons, John Daines and others and we told of our Chairman's appearance on the BBC tv programme Inside the Factory. We included articles based on the 45 members' zoom forums we've held since October 2020. These were started during the pandemic but have continued ever since – our most recent being in April when we welcomed Tola Sargeant to talk to us about Archives of IT.

Some of the news has been truly unusual – the naming of a meteorite '15462 Stumegan' in honour of Stewart Megan who worked on LEO III/35 in Bath and the inclusion this year by the Met Office of 'Mavis' on their list of storms - named after Mavis Hinds who did weather calculations on LEO I as early as 1951.

Your reminiscences

Then, of course, and very importantly, there have been your reminiscences of time working on LEO machines. We have been anxious to gather these in and publish them while memories are strong. During my time as editor we have published around 40 of these valuable personal memories – all now safely in our archive. Some indeed were ready by 2022 to be included in the second edition of *LEO remembered*, our anthology of reminiscences. We've read about LEO in Australia and South Africa and in what used to be termed the eastern bloc. We've ensured that the work of women in the LEO workforce is not forgotten. We've been given an insight into the off-duty side of work with LEO – the sports teams, the Bridge and the Pennant day competitions. We discovered that LEO was at the forefront of devising means of working for blind programmers.

We have also found out more about those who worked on LEO through the remembrance pieces we have published for those of our members who have recently died. We are grateful to their families who have helped us write these and answered our many questions. Sad though it is to report the loss of these members, we nevertheless take pride in remembering their achievements and their contribution to the LEO story.

As I put the last of my issues to bed, I would like to thank all those who have contributed their writings and photographs. Peter Byford has written an introduction to each issue and importantly put the contents into the context of the ongoing work of the Society. I'd also like to thank my colleague Bernard Behr who formats and publishes the assembled content and makes it look so inviting. Thanks too to other colleagues who ensure the final publication is sent out to members and that a paper version is made available to the very small number of members not online.

I am delighted to be able to pass the task on to Ron Condon – who as a – now retired - very experienced journalist in the IT field will be a very safe pair of hands. Ron will introduce himself in the October edition. In the meantime, I hope that reading this article may have inspired you to write something. If so, please contact Ron and me on Editor@leo-computers.org.uk

Editing *LEO Matters* has been a really interesting and rewarding task. I expect I will miss it, but I look forward to continuing to be an enthusiastic reader.

About Hilary Caminer

Hilary Caminer is probably the only Trustee with a totally non-technical background. Now retired, her career was teaching English in higher and further education, most recently at the OU. As the older daughter of David Caminer, a LEO pioneer, she has lived alongside the LEO story all her life and, wanting to help preserve the heritage of this amazing invention, accepted an invitation to join the committee. Her work for the Society includes co-editing the 'LEO Remembered' anthology, and until the next AGM in June , editing 'LEO Matters.'

The Land archivist post – working on the LEO archive at CCH

Ralph and Frank Land

We are excited to report that work to conserve, catalogue and digitise the LEO archive at the Centre for Computing History, Cambridge can now continue as we have been successful in gaining generous funding from the AIT Trust for a new archivist position.

A grant from the National Lottery Heritage Fund first funded our archivist posts – you may remember hearing updates from Jude Brimmer and Luke Thorne who both worked at CCH. That project was finished in 2023 but there is more to do as the archive continues to grow in both size and historical significance. The new post, the Land archivist, which is funded for two years, allows archival work to continue on this unique and important collection.

Our press release continued 'The post is named in honour of two remarkable pioneers in the history of computing, Frank and Ralph Land. Now 96 years old, the twins both worked on LEO in its very early days, starting as programmers and moving on to more senior roles. Ralph became Export Manager selling LEO machines abroad, including behind the Iron Curtain - for which he was awarded a CBE in 1995 and Frank moved on from LEO to become an academic at his alma mater, the London School of Economics, becoming the first holder of a chair in Information Technology. Frank was awarded an OBE in 2019. After retirement both brothers have devoted themselves to ensuring that LEO's role in computing history is widely recognised.

Catherine Griffiths, Trustee of the AITT said 'The Trust is proud to fund this post in honour of Frank and Ralph Land. Their involvement has spanned the whole history of LEO, the first commercial computing system. This has triggered worldwide development and has increasingly been recognised as a pivotal stage in the use of computers to serve business and society'

Moving Forward Again!

It was wonderful to hear that the AIT Trust would support further work on the Society's archive by funding a new archivist post based at CCH and we were very happy to appoint Kate Stockwell to the new Land Archivist role. Kate started work on 12th March and brings a wealth of experience in working with various Cambridge university archives with her.

Kate's priority going forward is to catalogue the material added to the archive later in the lottery-funded project and since. These papers include those produced or collected by John Pinkerton, Ray Shaw and John Daines, amongst others. To start with these collections will be catalogued but not digitised as the highest priority at this point is to list what's in the Society's collection rather than to make it available online. It is always possible to view documents at CCH or to request a scan of something, but if no one knows what's in the collection then even that becomes impossible! I hope that some scans will be added in due course either by Kate or a volunteer further down the line.

You can see the beginnings of Kate's work on the CCH website: https://www.computinghistory.org.uk/sec/73948/CMLEO-JD-John-Daines-Collection/.

Kate has made a fantastic start, and it is very satisfying to see work on the archive moving forward once again!

Introducing Kate Stockwell

I'm Kate, and for the last month I have been working as the Land Archivist at the Centre for Computing History with the LEO Computers Society collection. I come to this role from a background in College archives within Cambridge and I am looking forward to cataloguing the Society's collection over the next two years. I believe in diving in at the deep end, so I have delved in and picked up where the previous archivist left off, that is, box number 28 of 97!

Just four weeks later and I am now on box 49 and the archive store is looking ship shape. As Lisa mentioned, my priority is to get through the cataloguing. This will ensure that everything is accounted for, conserved appropriately, and made accessible online and in the archive. My aim is to complete cataloguing with time to spare so that I can then concentrate on digitising the most important documents in the collection.

I must confess, I am new to the computing world but I am enjoying learning about the technical details. I am particularly interested in how the invention and progress of the world's first business computer impacted on social and cultural history. As an early modern history graduate, I have been fascinated to find in the collection so far staff handbooks from the late fifties, pictures of women working with computers, and letters with humorous postscripts! I am sure I will find much more to amuse and fascinate me in the next two years.

Dr Elisabetta Mori, our LEO PhD, brings you up to date on her recent work

Elisabetta describes her very varied and interesting work in the IT field since her graduation in 2022 with a doctorate on LEO from Middlesex University

Over the last few years, I've had the privilege of contributing to various international projects: academic research programmes, academic publications, outreach and public engagement activities. I do hope that the Society is going to be pleased to read about the results of their support and investment in my professional development.

I was excited recently to be awarded the prestigious Juan de la Cierva postdoctoral fellowship (2024-2026) at the Universitat Pompeu Fabra in Barcelona. I am working in Prof. Daniele Cozzoli's History of Science and Modern Culture Research Group. My ongoing research is on the emergence and development of the European computer industry, and its relationship with academia and politics.

I have recently taken on several important roles, including serving as an associate editor for the IEEE Annals of the History of Computing. In addition, I became senior research fellow at The National Museum of Computing - TNMOC, Bletchley Park, a member of the IEEE Computer Society History Committee and of the History of Computing working group of AICA - Associazione italiana per il Calcolo Automatico. From January to May 2025 I returned to the UK as a member of the Modern History of Mathematics Programme at the Isaac Newton Institute for Mathematical Sciences in Cambridge.

Looking back, in 2022-23 I had the opportunity to serve as a visiting scientist at Software Heritage in Paris, where I worked on testing and developing the SWHAP process and contributed to the Software Stories initiative in collaboration with UNESCO and Inria. These projects focus on source code preservation, highlighting the critical role software has played in shaping the contemporary world. On that occasion I also organised an international event in Paris on the current state of software preservation, SWHAP Days.

Also in this period, I was awarded a grant from the Worshipful Company of Information Technologists - WCIT, with the support of Archives of IT. My research on the History of British Human-Computer Interaction included recording new oral histories and an article, titled *From Punch Cards to Brain-Computer Interfaces: 75 years of Human-Computer Interaction and its Impact on Society* **[1]**. A short video teaser about the research is also available **[2]**. My research on the subject has been recently presented in Barcelona at the 11th Conference of the European Society for the History of Science (September 2024), at the Computer Conservation Society in London and at an event at the WCIT (February 2025).

In 2023 I wrote an article for *The Guardian*, celebrating the life of *Yorick Wilks*, an important figure in British artificial intelligence **[3]**. In 2024, I contributed an entry on internet pioneer Peter T. Kirstein to the *Oxford Dictionary of National Biography* **[4]**. These public science contributions allowed me to reach a wider audience and share the rich history of computing with people outside the academic world.

In October 2024, I taught a course at the University of Pisa entitled *Storia dell'informatica e riflessioni sulla disciplina,* engaging with Italian computer science teachers, offering them new insights on how to use history to teach mathematical and computer concepts to high school students. My classes used the collections of the University of Pisa Museum of Computing Machinery, offering hands-on insights and suggesting interactive forms of education. This experience relied also on my previous employment with the Museum, where I had collaborated on their research project on Italian pioneers of Computing. Amongst its results I co-authored the podcast *Pionieri dell'Informatica*, based on interviews I recorded, highlighting the stories of key figures in the Italian early history of computing **[5]**. My international collaborations have also included recording oral histories for FOSSDA, The Free and Open Source Stories Digital Archive Foundation in the United States.

Looking at the future, this summer I'll be presenting my work at the International Congress of History of Science and Technology - ICHST 2025 in Dunedin, New Zealand. My talk, *Knowledge Transfers in the European Computer Industry* includes the case of EDSAC and LEO. I'm also excited about my upcoming paper showcasing original research on the LEO Computers, *The Influence of Organisation & Methods on Early Business Computing*, which will be published in 2025 as part of the book *Computing Cultures: Knowledges* edited by Arianna Borelli and Helena Durnová. **[6]**

[1] Mori, E., *From Punch Cards to Brain-Computer Interfaces: 75 years of Human-Computer Interaction and its Impact on Society,* September 2023.
https://archivesit.org.uk/wp-content/uploads/2023/09/From-Punch-Cards-to-Brain-Computer-Interfaces.pdf
[2]
https://www.youtube.com/watch?v=veA9kGBNJCw

[3] Mori, E., Yorick Wilks obituary, The Guardian, UK, 9th June 2023. https://www.theguardian.com/technology/2023/jun/09/yorick-wilks-obituary
[4] https://doi.org/10.1093/odnb/9780198614128.013.90000381652
[5] https://pionieri.unipi.it
[6] Mori, E., "The Influence of Organization and Methods on Early Business Computing" in Borrelli, A, Durnová, H. (Eds.), *Computing Cultures: Knowledges and Practices (1940–1990)*, Meson Press, 2025 (forthcoming).

A version of this article with fuller references and links is available to read on our website.

About Elisabetta Mori

Elisabetta Mori is a researcher and a historian of computing. She is a Juan de La Cierva postdoctoral research fellow (2024-2026), Universitat Pompeu Fabra, Barcelona. She holds an MSc in Architecture from the University of Florence and a PhD in History and Philosophy of Computing at Middlesex University. She is an associate editor of the IEEE Annals of the History of Computing, a Senior Research Fellow at The National Museum of Computing, Bletchley Park, and a member of the IEEE Computer Society History Committee. Elisabetta is also a valued member of our LEO committee.

LEO, CLEO and Premium Bonds
Eric Dickens

On 7 October 2024 I gave a Zoom talk about a project on which John Paschoud and I have been working. It all started because when I joined the LCS CLEO group there was no example of a CLEO program. Well, just one in the CLEO Instruction Manual - an update of a master file of cricket scores and the production of batting averages. I thought it was too complicated for someone to understand if all they wanted to do was see what CLEO looked like.

At the same time our lottery-funded project was creating a Virtual LEOI and looking to make this available to museums. So I thought it might be a good idea to show a CLEO program on the same screen. Vince Bodsworth is both an LCS trustee and a volunteer guide at The National Museum of Computing and I asked his advice about what would be needed for a CLEO Program to be shown there. He said that there was a screen next to a replica of ERNIE that was showing the LEO Film. As soon as he mentioned ERNIE (the random number generator for Premium Bonds) I remembered seeing pallets full of punched cards being read into a LEO III at Smith and Nephew, and that LEOIII/19 was purchased for the Premium Bonds in Lytham St Annes. Vince also found me a YouTube film that the post office made of the manual processing of the bonds in 1965, the year that LEO took over the job.

So I decided to do a small CLEO program matching ERNIE's random numbers with a file of Bond Holders' Premium Bonds. To make this as realistic as possible, I put out a call to LCS members asking if anyone had worked on the LEOIII/19 and five, John Cooper, John Daines, Barbara Dickens, Peter Gordon and Bob Harris, replied. They had all worked directly or indirectly on the project. This helped me confirm that what I was doing was roughly what would have happened in 1965. The LEO was actually purchased earlier, but it took some time to get the programs written and the job of taking on millions of names and addresses and bond details would have taken years.

My talk in October covered this background and contains part of the post office film. You can see it at https://drive.google.com/file/d/1PUv72seYLYVblsGHHH24zQLudPjq-6K2/view?pli=1 It takes about an hour. I watched the post office film many times to work out how they processed the winning bonds, and from that I wrote a small CLEO Program. To show this program working, John and I used an animation package to show the program steps and the tape reels moving. If you want to watch the whole of the Post Office film it can be found at https://www.youtube.com/watch?v=rOAfbb5D3Dw

The lines of code here are the main loop of the program. It matches the ERNIE numbers with the Bonds file which contains eligible premium bonds in bond number order. To make it simple, the ERNIE number is the sequence number of the Bond rather than an actual bond number. In this example the Bond 3CC3100 is being matched with a £2,500 prize for the 355th Bond, but so far the search has only reached the 160th bond – the bond count, so this Bond will not be a winner.

The version of this animation that is shown at the museum is a PowerPoint version, because there cannot be any interaction by the viewer with the program, there only being a button to move to the next screen. But the PDF does have a video included that shows the animation working. The tapes move and the printer shakes when it prints a line.

We also thought that this animation would be useful as an educational tool, or for visitors to be able to run it at home and study it in more detail. The interactive version is available at https://scratch.mit.edu/projects/1080774855 when it can be downloaded and the buttons used.

Vince also thought that to interest visitors to the museum, there should be a game, not just words to read. I can create a version with a game. Before the animation, the viewer needs to choose which bond holder might win one of the ten prizes, and then after the animation they will be told if they are correct. In the test data there are 10 prizes, 20 bond holders holding 1,000 bonds. But I need to know if there would be a demand for this.

It has also been pointed out to me that this program is also a good example of Serial file processing. This may be very strange to today's programmers, but everything we did was serial file processing. It involved a lot of sorting to get things in the right order for updating. I also learnt that the sorts in the LEOIII/19 project had to be rewritten because the manual system was filed in Lastname, first name and address order, a very long sort key. There was no Bond Holder Number, but this soon became necessary and I was told that programs were written to introduce this number and consolidate a lot of the duplicate records.

Since then someone, I think Vince, has thought that they could write a program based on my CLEO coding so that users can enter their own data and see what happens. This would not be a CLEO compiler, but would just take each of my commands and make it operate on the data files.

This has been a fascinating project and a big learning curve. I hope that you find it interesting and that it will be useful in the years to come. If you want to comment on it, please email me at edickens@virginmedia.com. A comment that I have received is that younger viewers will not know what is a Premium Bond. I think that there is a limit as to how much extra information we can add to the project and I would expect them to ask their parents, or look it up on Google.

About Eric Dickens

I was educated at Oundle School and Caius College, Cambridge, to which I won a Rolls Royce scholarship to study Mechanical Engineering and gained a 2.1 Honours. I joined LEO in 1962 and believe that I was responsible for the world's first main frame sales ledger, for EverReady batteries, leaving in 1966. After more computer jobs, the last 20 years of my career were to set up and run a small but very successful computer training centre in Peterborough, before retiring in 2003.

Early days with women programmers 1949-1959

Ongoing research and an appeal for your information. Professor Simon Lavington

The historical contribution of women to science, technology, engineering, and mathematics (STEM) is rightly a hot topic for journalists. When it comes to women in computing, existing accounts tend to be rich in social anecdotes but meagre in technological detail. I wanted to paint the wider picture.

For some months I've been collecting evidence of pioneering British women programmers who started work during the first decade of general-purpose electronic computers – say 1949 to 1959. Much to my delight, I've identified over sixty such pioneers. It is not only their life stories that interest me but also the technical context of their work. What organisations did they work for? What computers, what applications, what programming languages, what difficulties did they encounter?

For convenience I've divided the places where the women first programmed into three categories:

(a). Government establishments and academia: 23 women so far discovered;
(b). Computer manufacturers: 42 so far;
(c).End-user organisations other than (a): 2 so far.

It is convenient to place Lyons and LEO computers in category (b). For LEO the list of pioneering women so far includes (in alphabetical order):

Mary Coombs (neé Blood). Born 1929 died 2022; first programmed LEO in 1952.
Betty Cooper (neé Newman). Born 1930; first programmed LEO in 1955.
Pat Fantl (neé Cooper). Born ??; first programmed ?? in about 1955.
Kathleen (Kate) Fisher(neé Keen). Born 1936; first programmed LEO II in about 1957.
Helen Jackson (neé Clark). Born 1936; first programmed LEO in 1957.
Cynthia Reid (LEO engineer). Born 1935; first hardware design in 1957.
Judy Smythson (neé Worrall). Born ??; first programmed in about 1959.

Note: Cynthia was a hardware designer, indeed the first female British computer engineer I've come across, so I felt it important to include her.

There are several uncertainties and missing facts, for example dates of death, in the above Lyons list. I'd be most grateful for any new information. As for life stories, Mary Blood (pictured above), Betty Cooper, Helen Jackson, Kate Keen and Cynthia Reid have been interviewed by others and I feel I have sufficient of their life stories to be able to add depth when describing their computing activities. Nevertheless, any fresh personal anecdotes and especially any photographs would be very welcome. This is especially true for Pat Fantl. I believe she was born in America. Pat had a maths degree and worked for some time for an aircraft firm (which one?), doing various mathematical calculations. I do not know when Pat came to England but I believe she joined LEO Computers as a programmer in 1955. I think she had written code before joining Lyons. Does anyone know more details?

LEO was used by several outside organisations within the period 1951 to 1959. Some of them may have employed women programmers. I am aware of the Met Office and the renowned programmer Mavis Kathleen Hinds. I think she and Fred Bushby started using LEO right at the end of 1951. It would be good to have the exact start and finishing dates of the Met Office's use, before they transferred their programs to the Ferranti Mark I in Manchester. A list of other external users, with dates, would also be useful.

One of my other challenges is to estimate the male/female percentages in the programming teams during the 1950s. This is tricky, if only because women usually left work to start a family or transferred to part-time work so membership of a particular group fluctuated as time went by. Here is a snap-shot of the state of play in British computer manufacturers in 1953, so far as I've discovered:

Company	***Software team in 1953: Total,*** *of which* ***Women=***	***Commercial product and date of first delivery***
Elliott	7/ 3	402 /1955
Ferranti	14 /8	Mark I /1951
English Electric	6 / 0	DEUCE /1955
BTM (later ICT)	4 / 4	HEC 2M 1955
Lyons (Leo)	9 /1	LEO II /1958

BTM is a special case. The company started recruiting to the specific job *programmer* in 1953 and the first year's intake happened to be four women. Looking at the above Table it is tempting to speculate that, in the mid-1950s, women usually made up about 40% of the programming teams of the UK's computer manufacturers.

Accurate statistics for subsequent years are hard to come by but, as an indication, an Australian government survey of 271 electronic data-processing organisations in 1965 revealed that only 18% of programmers were female at that time. Anecdotally, many observers feel that the percentage of women programmers in the first decade of stored-program computers was higher than it has been in subsequent decades. Part of my study is to examine the reasons for this. At first glance, it might have been because in the 1950s women maths graduates were generally cheaper to employ than male graduates. More significantly, in the years before general-purpose computers, women had proved themselves to be more accurate and more diligent when carrying out tedious repetitive calculations on electro-mechanical desk calculators. When general-purpose computers first arrived with their primitive assemblers, writing and debugging machine code certainly demanded accuracy and diligence. To take a case in point, when in 1962 the Commercial Union Assurance Company first installed a computer (an English Electric KDP10) the strategic task of Systems Analysis was male-dominated whilst the implementation of machine-code programs was the responsibility of women. One former CA employee remembers that: "men were felt to be creative and women accurate!"

In conclusion, women clearly fulfilled many roles in the early days of computers. My focus is on those who actually wrote code. Such pioneers normally created software, rather than using other people's software. In the 1950s they would usually, but not necessarily, have had maths or science degrees. Women whose principal job was data-preparation or computer operation or computer installation management etc. would normally be outside the scope of my study.

If anyone has information on women programmers of the years 1949 to 1959 I'd be most grateful for details. Please contact me at lavis@essex.ac.uk

About Simon Lavington

Simon is Emeritus Professor of Computer Science at the University of Essex. He graduated in Electrical Engineering from Manchester University in 1962, after which he worked on automatic speech recognition using the Atlas supercomputer. He then joined the design team of the Manchester MU5 supercomputer. This was followed by research into hardware and software support for knowledge-based systems. Upon retirement in July 2002, Simon spent more time on his hobby of computer history, about which he has published six books. He is the Digital Archivist for the Computer Conservation Society.

On being a Leo II/5 operator at Hartree House

John Hall

I arrived at Hartree House the LEO Computers London Service Bureau (located within the Whiteleys department store building in Bayswater's Queensway), on Monday January 30th 1961 having survived aptitude tests and interviews with Bill Steele the Leo II/5 Operations Manager and Peter Wood the LEO 1 manager. As I had previously been working for the Met. Office on duties that included operating their Ferranti Mercury computer the environment was not

entirely new to me although punched cards and magnetic tape were not part of the Met. Office configuration. My starting wage was £9 per week.

Initially, along with fellow newcomer George Gadd, John Andrews took us under his wing and introduced us to the art of Job Assembly which typically involved sorting reams of punched cards for the Durlacher stock jobbers program and the Glyn Mills Bank military officers payroll. As is often the case with mechanical equipment, sorting did not go smoothly so we soon became adept at clearing card jams and re-punching damaged cards. Additionally, there were magnetic tapes to allocate to the jobs and checks to be made on continuous stationery stocks.

A four shift system came into operation on 27th February 1961 and I became the trainee operator on Julian Shindle's shift starting the new shift pattern with three night shifts and five days off. There was a generous shift payment too which bolstered salary quite considerably. The four shift system covered 24/7 although that was probably a phrase unheard of in 1961 but initially the weekends were covered on an 'as needed' basis.

All the operating staff were male and, over time, staff came and went and promotions to Shift Leader or Chief Operator helped to boost morale and encourage staff to get a full knowledge of the work being processed and the operating techniques required to run a successful shift. This included "listening" to II/5's sound transmissions as each program had its own distinct "tune" and errors such as a program loop could be detected by a change of rhythm. Some programs did not require much operator intervention and it was possible to tune in to II/5 on the radio in the adjacent engineers' room when having a coffee break.

Ideally a team would consist of the Shift Leader and three other staff, one of whom, usually the junior, could spend considerable time on card sorting and other job assembly duties. Four staff could cover meal breaks taken in local cafes or the nearby Redan pub but at holiday time three operators would have to cope. Leo II was only capable of running one program at a time and the majority of the jobs were payroll which required considerable printing time on the Powers Samas Samastronic printers which were dot-matrix line printers. Fortunately II/5 had two printers as they were not the most reliable of equipment.

One problem that manifested itself on the Glyn Mills payroll involved the multi-part continuous payslips. After a page throw, the momentum caused the paper to rebound just as the first line of the new page was being printed which did not produce quite the desired result! The eventual and cheapest solution was to have an operator standing by the printer, feeding the stationery through his hands and applying tension to prevent the bounce back. Many a night shift operator dozed off when on this printer duty. Another operator duty, on a Friday evening, was to go to nearby Paddington Station and collect, from a Birmingham train, wooden boxes containing punched card data from Lightning Zip Fasteners (remember them?). The boxes were then conveyed to Hartree House by taxi and the cards sorted into the required sequence. The processing of the data produced a production schedule for the coming week which was returned to Birmingham on a Sunday train.

There came a time when the II/5 work load became so great that processing time was taken at night on LEO II/7 at the British Oxygen site in Edmonton (North London), and this involved the night shift having to split two and two with, by necessity, a qualified driver/operator to drive a Bedford Dormobile van to Edmonton. This was loaded with the cards, paper tapes, magnetic tapes and stationery for the jobs allocated to II/7. I remember an occasion when the rear doors of the van opened en-route and listing paper (known as Teashops to one and all) cascaded down the road. Luckily it was a dry night so none was lost to the elements. Eventually, II/7 was transferred to Hartree House as a backup to II/5 and the journeys down the A10 ended.

The advent of the LEO III range had resulted in LEO III/1 being delivered to Hartree House on Sunday April 15th 1962 and being craned in from Queensway through the windows of II/5's off-line area. The lack of health and safety concerns in those days is astounding by modern standards but everything went fairly smoothly. When plans for installing III/1 at Hartree House were announced some operations staff were transferred to Minerva Road to start training and this resulted in changes in Shift Leader and Chief Operator positions and further changes were made as other staff went off to work at other Leo III installations around the country. As a result of these changes I became a shift leader in late 1963 and continued thus until June 1965 when I became Chief Operator after Mike Canton moved on to pastures new.

However, by now much of II/5's workload had transferred to III/1 or to customers' own computers and II/7 had probably been shut down and removed. I certainly remember the incident related by Mike Canton in November 2024 *LEO Matters* regarding the one handed operator as I was on Mike's shift at that time. His name was Ben Vaz and, as Mike rightly says, he mastered all the equipment one handed and believe me, loading a Decca magnetic tape deck one handed was no mean feat.

At various points in time, mergers between LEO and the English Electric and Marconi computer divisions had occurred bringing the English Electric KDF9 computer into the product line. In 1965 it was proposed to replace II/5 with a KDF9 for bureau work and as the incumbent chief operator I was offered that position on the forthcoming KDF9 which I accepted. I handed over the supervision of II/5's final months to Roger Iddles and then went off to learn about the KDF9 and spent most of November 1965 with De Havilland at Hatfield. This resulted in me being offered the Chief Operator post as an employee of Marconi and in January 1967 I moved to Chelmsford and thus my direct connection with LEO and Hartree House ended. The LEO II Bureau had closed in September 1966.

I also have notes of shift members on LEO II/5 from 27th February 1961

A	B	C	D
Julian Shindle	Eric Housden	Dick Halford	? Sedgebeer
Ernie Harrison	Bob Stevenson	Colin Cook	Frank Kelly
? Waite	? Markes	George Gadd	Pete Hopson
John Hall	? Taylor		

Shift times were: Days 0830-1730, Evenings 1300-2300, Nights 2230-0900

About John Hall

John was first employed by the Met. Office which brought him into contact with computers. He joined LEO in January 1961 as a trainee operator on LEO II/5. He progressed to Shift Leader and then Chief Operator, and then transferred, in 1966, to the Marconi Company in Chelmsford as Chief Operator of their KDF9 and later, their System 4/70. Later jobs were as Operations manager at University College Hospital, London and as Network Manager for House of Fraser in Swindon. He retired to Cambridgeshire.

Working on LEO III as a student apprentice in 1963

Leon Heller

During my time with EELM as a student apprentice, I worked on a couple of interesting computers - an old LACE (Luton Analogue Computing Engine) using valve technology and the then new LEO III which used transistors.

The Kidsgrove LACE had been used to stimulate the electric motors of the Deltic and solved a problem with them burning out. I got very proficient at setting up the analogue multiplier unit - several interacting potentiometers!

In 1963, in my third year I was seconded to the famous LEO (Lyons Electronic Office) factory in Minerva Road, Acton. I designed a small part of the LEO III - an audible monitor circuit which enabled operators to tell if a program was stuck in a loop by the sound generated. The LEO I and II were valve-based and were so slow that an amplifier and loudspeaker could simply be connected directly to the CPU. The transistorised III was so fast that the pulses had to be divided by 100. I was tasked with designing a suitable circuit. Binary dividers were deemed to be too expensive so I simulated a unijunction transistor (recently invented and not yet available) using a PNP-NPN pair and connected it to a diode pump integrator. That divided pulses reliably by 10. I used two of those circuits to give the required division by 100.

My circuit could be used to play 'music' with a suitable program, and there are recordings of it.
I also constructed a logic probe by modifying a staticiser package. The probe itself was a Bic ballpoint pen with the ink removed and a wire soldered to the point running up the pen and connected to the staticiser.

Another, rather boring, job was testing microcode assemblies using an automated tester. The assemblies consisted of large T-shaped printed circuit boards with ferrite cores with wires threaded through them in various configurations. We called them 'banjos'. To alleviate the tedium I used to repair them myself instead of sending them back to Kidsgrove to be reworked!

About Leon Heller

After my student apprenticeship at EELM I worked for Rank Xerox UK as National Workshops Planning Engineer. I then got a psychology degree and subsequently worked mainly as an engineering psychologist for various companies on user interface design. I also worked on embedded systems design.

Remembering William (Bill) Sant

31 Dec 1934 – 15 Jan 2025

Bill Sant who died this January aged 90 played an important role in the early days of computing at the Customs and Excise office in Southend. Bill was a LEO programmer, senior programmer and trainer and contributed a lively reminiscence to our LEO remembered anthology. We are grateful to his family for the personal information in this account of his life.

Bill was born in 1934 in Moulton, Cheshire. Having left school very young, he started work as a telegram boy and then became a postman, later working on a Post Office counter. He worked hard to better himself, taking courses, reading educational books and learning new skills. In 1960 Bill transferred to the Civil Service and moved first to London to work as a Customs Officer at Heathrow Airport and later to the Customs office in Chester.

In his quest for knowledge, Bill started to read about these new things called computers. He

heard that the Civil Service was opening offices in Southend-on-Sea using computers to process Customs and VAT records. He took and passed an aptitude test for programming and in 1965 he and his family moved to Southend where he became one of the first ever professional computer programmers.

In Bill's account of his work on LEO he writes; 'Our computer was LEO III/9 and it occupied the ground floor of our building and the 'database' filled a room the size of a badminton court. The power and capacity of LEO III was a tiny fraction of that of today's laptops but programming this monolith was a challenge.' 'This new technology was an exciting challenge…but the motivation and entrepreneurial spirit of all these new 'technocrats' fired the development of Customs and Excise computing. The only other Civil Service computer user at the time was in the Post Office.'

Bill excelled at computer programming and gained successive promotions. He worked on LEO III/9 until it was decommissioned and later became joint branch manager until his retirement in 1992. He was offered an MBE for his services but declined on grounds of principle.

Bill had many interests and hobbies including golf, dancing, bowls – and his classic 1958 Austin Westminster. He became a self-taught expert in foraging wild mushrooms and picked thousands for consumption (mostly without ill-effect!). He was passionate about gardening, wildlife and the natural world. Bill was a devoted family man and was delighted to have four grandchildren.

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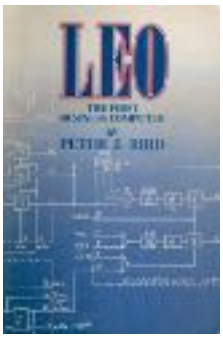

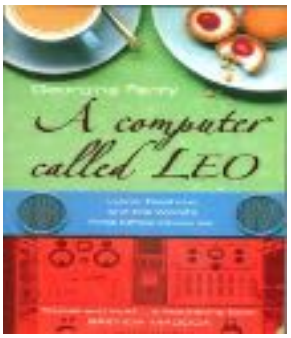

LEO remembered - by the people who worked on the world's first business computers. Edited Hilary Caminer and Lisa-Jane McGerty £8 This edition is a second, much enlarged version of the original 2016 book. There are well over 80 contributions from people who worked on LEO computers from the very earliest days – even before it went live- to those who worked on later machines across the UK and around the world. It is illustrated with contemporary photographs.

'LEO: The First Business Computer.' Peter J. Bird. Special price: **now reduced** from £10 to £5. This hardback book gives a very thorough account of LEO's story and is illustrated with many contemporary photographs.

'A computer called LEO. Lyons teashops and the World's First Office Computer' Georgina Ferry £8. This paperback gives a very lively, non-technical introduction to LEO's story.

'Legacy' Thomas Harding £8 The story of the rise and fall of the Lyons' empire and the extraordinary family behind it. Illustrated paperback, signed by the author.

To buy any of these items, please just send a note to Secretary@leo-computers.org.uk and we will take it from there.

LEO COMPUTERS SOCIETY

REGISTERED CHARITY NO: 1182253

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Ron Condon, newsletter editor in waiting

We also have a group of **much appreciated volunteers** who help with a variety of activities. Examples are helping with oral histories, transcribing the Ernest Lenaerts' notebooks, looking after our LEO plaque in Lyons Walk , giving presentations on LEO and giving us specific advice on a variety of issues.

Please, if you feel you can join this group of volunteers contact us at Secretary@leo-computers.org.uk

STOP PRESS: QUEEN'S HEAD REUNION

The recent get-together at The Queen's Head on Tuesday 20th May was a great success. In addition to the usual opportunities to chat to old – and new- friends, we were introduced to a preview of the new building about to be built by the Big Self Storage Company on the site of the old Cadby Hall in Hammersmith. You can read a full report of the event and see some photos on our website at **https://www.leo-computers.org.uk/leo-get-together-at-the-queens-head-hammersmith-20th-may-2025/**