

## DEPARTMENT: ANECDOTES

## Working and Living at Bletchley Park

The burgeoning histories of Bletchley Park's decryption and cryptanalysis operations during World War II have recognized the invaluable contributions of the 8000 women who comprised 75% of the staff. Some emphasize the number of wealthy debutantes who were recruited, or those who demonstrated their skills in lateral thinking by solving crossword puzzles. Eleanor Ireland fits neither of these categories. This anecdote is edited from her oral history with Janet Abbate and her own memoir, both of which are available on the Engineering and Technology History Wiki, which is maintained by the IEEE History Center.

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Born in 1926 to middle-class parents, Ireland graduated from the Berkhamsted School for Girls at the height of the war, in 1943, where she "got distinction for English language, English literature, French... but I only passed in Maths [laughs]." To prepare for architecture school, Ireland took "did have extra coaching in trigonometry, and all ghastly things like that," but her father declined to underwrite the degree on the fear that she would be called into military service. After a year of dull work for a philately shop in London, she followed a friend and enlisted in the Women's Royal Naval Service (WRNS, or Wrens). Ireland trained for three weeks in Scotland, and then was "drafted down to Bletchley.... 'You're all going to a station fifty miles from London.' We all groaned.... We'd thought we were going to sea, you see! [laughs] A bit depressed about that."

Ireland and 40 of her fellow Wrens took an overnight train filled with military personnel to Bletchley Park, which for naval purposes was named His Majesty's Ship *Pembroke V*. There they were processed and informed "that we were going to do very secret work. We could not tell anybody else what we were doing, neither were

we to communicate with each other about what we did whilst we were on duty, nor were we to talk to anybody else about work on the site. And we all had to sign the Official Secrets Act.... [W]e came out of there fairly traumatized by the whole thing [laughs]. This was not what we'd been expecting at all!"

For housing, Ireland's group was billeted at Woburn Abbey, the 200-year-old family seat of Hastings William Sackville Russell, 12th Duke of Bedford. He was a Nazi sympathizer who, astonishingly, "would come and have a look around every now and then to make sure everything was all right." For Ireland and her workmates, they appeared to be: "The rooms were very grand since they were formerly bedrooms used by the family. The loos [toilets] were of Delft China and raised two steps above the floor. The walls were lined with red silk. The bathrooms were also very impressive, very large and again the bath was on a 'throne' two steps above the floor, encased in mahogany and very gloomy." But that was not where they lived off duty. "Mind you, everything had been taken out, absolutely everything. It was very bleak, and very bare.... a bunk bed, and then we had one chest of drawers each. Eventually... eight of us were... right up into the servant's quarters at the top [laughs], and we lived in that room under the eaves.... [T]here was one cupboard in which we would keep our luggage.... [W]e kept some food in there for a while, until we found the resident mice [laughter]... [I]t was terribly cold in winter; bitterly cold—because Bedfordshire is one of the coldest counties in the country, you know; completely flat... right to the coast there. We used to have the windows open—had to, because there were eight of us. During the winter the snow came in and stayed on the windowsill for about three weeks!" It was a room with a view of the duke's estate: "The park was magnificent, with seven lakes and several herds of rare deer. I loved the view from our cabin window."

Meals were served in the basement. "[W]e came through a long flagstoned passage, heavily worn by time... and that's where we ate. We all had our own mug, with our name on it, which we took everywhere. Later on... [t]hey opened up a room... and they made it into a

little sitting room.... [P]ut some sofas in with pretty cretonne covers, and a fire. So that was much better."

A day after settling in at the abbey, "we were driven into Bletchley Park in an old army transport bus with a soldier at the wheel. The bus stopped at the main gate and we all got out and showed our passes.... From there we were escorted past a tennis court, past some very hideous low concrete buildings on either side of a drive to Block F, another concrete building. They were all very grim and as we later on learned, bombproof.

"[W]e were met by Max Newman, who introduced himself and welcomed us. We were taken into a long low room with a very large blackboard and long tables. [He] stood in front of the blackboard and we all sat at the tables. He was a professor from Cambridge, a mathematician. He had a very pleasant manner and put us at our ease. He told us that this was a fairly new section which had been recently set up and that we would be working with mathematicians and engineers. He had specifically asked for Wrens to man the section, run the machines, and organise the Registry Office. For a fortnight we went in every day and he lectured us on a new type of binary maths which he would write up on the blackboard."

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Having learned the rudiments of AT&T engineer Gilbert Vernam's Boolean "exclusive or" (XOR) cipher system, in two weeks from one of the United Kingdom's finest mathematicians, the young women "were tested on our knowledge and, depending how well we performed, were sent to various tasks—in administration, dealing with the tapes as they came in, etc. I was delighted to be put on Colossus, which I considered was the plum job!"

The Wrens also toured Newman's section, which he ran "very well because it was a very happy place. You know, everybody was kind. They were all similar kind of people, who wanted to help as much as they possibly could, and there was no friction of any kind. I never heard of any friction: never a cross word... to me when I was there, and I didn't hear anything about

anybody else. It was a very happy state to be in: everybody trying to do their best. Now that makes a lot of difference; you know, it's a case of teamwork."

They learned about the teleprinter tapes they would thread onto Colossus's photoelectric system and process in the search for nonrandom text strings: "We were shown the room where the messages came in on teleprinter tape on two separate machines. Most of the messages came from Knockholt and Kedleston in Derbyshire.... We were shown into a very long room where tapes were cut and joined, and tapes that had split on the machines were repaired. Then we went to Ops or Registry itself where all tapes were registered and tabulated and put into a series of cubby holes."

"We had to learn the alphabet punched on the tapes and become adept at reading them. The tapes were one inch wide and very strong and the alphabet the same as the GPO [general post office] teleprinter alphabet. On either side of each sprocket hole there was space for two holes to be punched above and three below so that, for instance, A was two holes above the sprocket and nothing below. On the Colossus machine these sprocket holes went past an electronic eye at 5000 per second, so that 5000 [characters] registered per second."

Ireland was "was absolutely transfixed by" Colossus. "All these whirring tapes, and the noise of it all, as all the sprockets went through. Oh, it was a huge machine! I found it rather exciting, actually.... I'd never seen anything like it in my life before, you know."

"We were shown two Colossus computing machines they had at that time.... I was taught by... Jean Bradridge how to operate the machine, what all the switches were for, and how to peg a wheel pattern on the grid at the back of the machine with pins that looked like very large, very strong hairpins, copper nickel-plated. The tape was shut into position in front of the photo-electric cell, which had its own small gate for the tape to slide through to keep it in place. According to the length of the tape one used as many wheels as were necessary to make the tape completely taut. This was a tricky operation, getting the tape at the right tension. It took a little time and had to be done with great care—this was rather hair-raising. We were terrified of the tape breaking if the tension was wrong and valuable time might then be lost."

In time, Ireland was promoted to Leading Wren and trained her own assistant as the number of staff continued to increase: "[W]hen I was given a new Wren to instruct I was worried about leaving her for very long, so when it came to our meal break I would hurry back to make sure nothing awful had happened. All the

'break ins' we put on were timed and they generally took about one hour to run. Every single tape was logged on and off in a book—the time we received the tape and the time it was taken off the machine. It was instilled into us that time was of the very essence. We knew we were working against the clock and that the lives of people depended on it."

"Another big block was put up with two more Colossus. These were the improved and much larger Mark II version. I was sent to work on Colossus 3 and my friend Jean Beech was on Colossus 4. These were housed in an enormous room. They had 2500 valves [electron tubes] instead of the 1500 on Colossus Mark I and in fact were twice as big and five times as fast—25,000 characters per second were read."

The process of using Colossus to decrypt a message was a collaborative effort between the Wrens and the cryptographers. Ireland was part of Newman's expanding effort to automate the decryption of German Army High Command (*Oberkommando der Wehrmacht*, or OKW) messages. These "fish" were enciphered by Lorenz SZ machines whose twelve rotors offered a possible 1.6 quadrillion starting positions, and then sent wirelessly between Adolf Hitler and his staff in Berlin, and army group leaders across Europe. In 1942, William Tutte and his research section elicited the logical structure of the Lorenz or "Tunny" machines that they had never seen. They developed a "Statistical Method," the "1+2 break in," for comparing cipher text to the key that changed daily and determining which characters and strings appeared non-randomly.

"Jean and I worked by ourselves with a mathematician codebreaker, or 'cryptographer' as they were generally called. He would sit at a long table facing Colossus under thick meshed windows—all very spartan. These mathematicians came mainly from Oxford or Cambridge. Some came straight from university and some were a little older. The only name I can remember... is Sandy Green. Others would come in such as Jack Good, Donald Michie, Shaun Wylie, to discuss what was going on and make suggestions. On the tables in front of them were sheets of codes and they used slide rules to make their calculations. Whoever we were working with would tell us what they wanted from the machine."

"We would pin up on the grid at the back of the machine whatever they were working on and put on the tape they wished to run against it. At the front of the Colossus were switches and plugs. We could set switches to make letter counts—how many E's, A's, S's, etc. were on a tape. The machine had its own [electric] typewriter and would record all this. Sometimes we were given a norm and as each figure came up on the

typewriter, one calculated and wrote down against it how much above or below the norm the figure just typed out was. I became very good at mental arithmetic. What was pegged up at the back of the machine were Lorenz wheel patterns, and the tape on the wheels was an intercepted message tape. The purpose of Colossus was to find out what the positions of the code wheels were at the beginning of a message, and it did that by trying all the possible combinations...."

In April 1944, 68 Wrens and six cryptographers used the first Colossus and three earlier Heath Robinson machines to accelerate the comparison process. Ireland was one of the additional 112 Wrens who worked in the "Newmanry" with 14 more cryptographers in the newly constructed Block H by September. Another 93 Wrens and two cryptographers joined by the end of the European war in May 1945.

The Wrens operated on a 24×7 schedule with everyone else at Bletchley Park: "[W]e worked on four watches: eight to four; four to twelve; twelve to eight—so we did a week of days, a week of nights, and a week of evenings, and a week of change-overs—this was the fourth week, when we filled in any gaps in A watch. We [the women in C watch] worked with A watch, mainly. C and A watch were integrated together, and B and D watch integrated together.... [The] week of change-overs—say we went on at eight, and came off at four—we might have to go on at midnight, again; so that week was pretty grueling.... [A]t the end of that week, we had a weekend off. And we had a weekend off once a month."

For the rest while staying at Woburn Abbey, "Sometimes we used to row on the lake, in the middle of the night; they had a little rowing boat, and ducks used to quack as we rowed around there. It was a fairly uneventful life, really; very uneventful. Because we were out of all the bombing."

For recreation on those weekends, "I often went up to London. We weren't all that far from the A1 [road], so we used to hitch a lift.... in cars or lorries! But it was mainly lorry drivers who seemed to stop for us. And we would sit up in the front with the driver [laughs]. Some of them were very nice. They used to take us in to one of their lorry drivers' pull-ins and give us breakfast."

"When we got to London,... I often went into Fortnum & Mason's for tea.... And we often went to... the Stage Door Canteen, in Piccadilly where... we used to hear Glenn Miller.... [W]e used to dance, and we thought that was great fun!"

This was some compensation for the living conditions, which were stressful for physical as well as psychological reasons. The work shifts gave Ireland

“terrible varicose veins, because I literally stood for nine hours at a time on these hard composition floors. We did have a little stool in front of the teleprinter, but I didn’t sit on it very much! [laughs]”

Moreover, “[it] was terribly cold in winter!... [T]his is quite incredible, really—we were allowed, in the winter, to wear any jumpers or pullovers that we wanted: completely non-uniform. I can remember wearing a turquoise blue jumper [laughs]... We felt we were a little special, just like the pilots that were allowed to wear something non-uniform. I thought that was very good [laughs]... [I]t was very cold—but then, you see, we’d been used to being very cold. I mean, when I was at school at the beginning of the war, we sat in our classrooms with our overcoats on... because we couldn’t have the heating on.... I didn’t mind the heat generated by Colossus. It was just nicely warm, you know, during the winter, with all these valves pulsing away!... Oh, they must have devoured electricity, those machines we worked on. All these huge clicking valves pulsating; the whole thing was pulsating. They generated a great deal of noise, of course, as one valve after another pulsed in, and then the whirring of the tapes. It was quite noisy.”

The food was memorable, but not in a good way: “When we first arrived, we ate in the mansion with the Foreign Office personnel and the food was good; but when there became too many of us, they built some huts near our block and we ate there. The food was fairly grim. We found it difficult to eat on night watch—we never became used to eating then so would often walk out of the gate down a side alley to Bletchley Station. At the end of one of the platforms was a NAAFI hut and we would eat buns and drink a decent cup of tea before walking back—better than cold liver and prunes. I did not eat another prune for over thirty years!”

In the last half of 1944, the number of Lorenz tape messages decoded at Bletchley Park rose nearly 50%, and then doubled by the end of April 1945. Fifty years passed before Ireland and her fellow Wrens in the Newmany learned the import of their work, which generated mixed feelings of frustration and pride. “I wish we had been told, occasionally. It would have given us a bit of a fillip, to have known something that we achieved; because... from what I’ve heard

since, a lot of the departments were told when they’d done anything really successful, as a result of which a submarine had been sunk, or a battleship.... Or they’d won a battle. And of course it was vital on D-Day, when we went into France.”

“I’m glad I did it, very glad I did it. Because I can look back on it all, and think, ‘Oh, yes; right. We did something really worthwhile. We helped.’ So that satisfies me, satisfies me that I did a really useful job. And I think that’s the way most of us think of it—fulfilled that we did a very useful job in the war. Because we all knew that it was very important and vital work.”

Despite her work as a pioneering programmer, Ireland had no interest in using a computer when they became widely available. “I know, you’re thinking it absolutely ghastly! There’s a computer upstairs—and [laughs] my son and his wife both use it, and three of the children. All very adept at it. I just don’t want to know.”

Nonetheless, she kept a souvenir of one Colossus when Bletchley Park’s staff were ordered to disassemble eight of the ten in operation in 1945: “Very naughty. I’ve got a little blue valve,... [w]hich I’ve treasured in a little box.”

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