Wargrave Local History Society

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The People and Places of Bletchley Park - Peter Marcham

Wargrave Local History Society resumed its programme of meetings, following its summer break, with a presentation by Peter Marcham on *The People and Places of Bletchley Park.* Peter is one of the guides at this historic site where, during World War 2, the allied code breakers worked in secret to reveal critically important information, developing new techniques and equipment, so was able to give a fascinating insight into its work and some of the personalities involved.

Peter began by explaining that about 75% of the staff involved in the work of Bletchley Park and its outstations and listening stations were women, and about half of the total of 9,000 came from the armed forces. However, the work for which Bletchley Park is now celebrated had its origins many years before WW2 was declared in 1939. During WW1 Germany had invaded several of its neighbouring countries, and as it began to re-arm the intelligence services in both France and Poland were keen to know what the Germans were doing, often sending sorties over the border. The French discovered that Germany was developing long-range bombers putting Paris at risk, whilst the Polish had developed ways to intercept German messages, by mail, telephone, teleprinter or wireless. Of the German armed forces, its navy had the greatest networks, so the Poles concentrated on those, and built up a good intelligence library. The French and the Poles were logging lots of the German's Morse code messages being sent by short wave radio. However, by the end of 1927 / early 1928, some of these messages were becoming unreadable gobbledegook. The Germans were evaluating an Enigma machine. Looking like a typewriter, this part electrical and part mechanical device encrypted each individual letter using 3 rotors having 26 positions (one for each letter of the alphabet - there were no numbers). The rotors were each wired differently and could be changed in position, and there was a set of 5 from which the active 3 were chosen, whilst on the front of the device was a patch panel to alter particular settings. In use, it was necessary for the sending and receiving devices to have identical settings, so the operators were provided with a code book each month to find how to arrange the discs and patch wires - the arrangement changing every day. (and was different for each of the German networks). As well as the person creating the message there would be the Enigma operator and the radio operator. If there was a problem in creating the encoded message, the radio operators would keep the radio frequency open with unencoded chit-chat between themselves - with details of their name, callsign, where moving to and so on - all useful clues to the listening French and Polish intelligence officers. Ideally, they wanted to find an Enigma coding machine to study - an army one probably being easier to capture.

Pressing a key on the Enigma machine caused a bulb below one of the letters on the top to be lit, as calculated by the 3 discs set towards the back of the machine. The discs rotated at each key-press, and could be changed with the pair on the left, to create the encrypted text.

A vulnerable German, Hans Thilo Schmidt, - who in return for lots of money and alcohol - provided details about the Enigma. It was not just how it worked, however, that mattered, but how it was used. There were an enormous number (103 thousand, million, million, million) possible combinations - but the Poles found that there was a pattern within the rotors - it was not an ordinary word-based code, but used a mathematical

algorithm. It also had an Achilles heel, as it could not encode a letter as itself (hitting, say, the 'Y|' key many times could produce an output of any of 25 letters, but never 'Y'). This led the Polish mathematicians to look not for what it could do, but what it couldn't, and attack the problem that way. It took the Poles many thousands of hours work, but by 1932 they had found a way to break its codes.

By 1933, however, the Third Reich had come to power in Germany, and Adolf Hitler its Chancellor, and by 1935 the French and Polish decided that they needed to involve a third nation in the secret intelligence process, and they asked the United Kingdom. The country already had its own codebreakers, the Government Code and Cypher School (now known as MI6), but they were mainly wordsmiths. The head of the secret intelligence service was Hugh Sinclair. He needed to get people to help with the task, as none of the existing team of 80 were mathematicians, and they also had to find a more suitable location than London SW1.

To find suitable mathematical experts, an approach was made to the '2 top universities' in the country, where the Heads of Department were not told why they were being asked, just that "we think you have the skills we need". If they were willing to help the Government, they were asked to sign the Official Secrets Act, so as to be ready when needed. None of them knew what the work was to be until they arrived at the Park.

The other problem was to find a suitable location. There was a railway line from Oxford to Cambridge, and a sleepy village called Bletchley about half way, where that also a junction with the London Midland and Scottish railway. A hunt was then made - in absolute secrecy - to see if there might be a suitable property nearby, and they found a large 580 acre country park. It was the home of Lord and Lady Leon, but there was only one significant building - a 15 bedroom Gothic mansion, along with farm barns and a cricket pavilion. However, many local people worked there, who would likely have worked on what was to take place there. A vital need for an intelligence centre was for there to be good communications - and the GPO (who provided telephone services at that time) were able to say that the biggest high-capacity cable in the country was the London to Birmingham No 1 circuit, which passed within a mile of Bletchley Park - and there was a repeater station in an anonymous looking red brick building nearby at Fenny Stratford to clean and boost the signals. Captain Ridley - who had the task of finding a suitable site - looked at 5 other sites in the Home Counties, but none of them were large enough, and although two could have worked in tandem, that would have been less efficient, and present a greater risk to the secret operation. Lord Leon had died in 1926, and the estate was then being run by Lady Leon and her children, but by 1936 it was becoming run down, and after Lady Leon died in 1937 Bletchley Park was put onto the market, split into several lots, one being the mansion and 54 acres of land. The problem for the intelligence service was they wanted to remain invisible, so they waited to see what happened. There was only one bidder, Hubert Faulkner, a local builder, who paid £6,500 hoping to be able to build houses there. He then got a 'knock on the door' from the Government, offering to buy the property from him for what he had paid, with his company to build 'to our specification' what would be needed there. The only snag was that all of the builders and their families would have to sign the Official Secrets Act. The other problem was that Hugh Sinclair did not have £6,500 to spend! He could hardly go to HM Treasury, who no doubt would have said 'who are you? - what do you want it for?'. Hugh managed to raise the funds from his aristocratic friends, and so the property belonged to him until 1946.

Having obtained a site, the next problem was to appoint staff to work there. There were mathematicians on standby, but others would be needed to analyse the messages received, or to translate them into English, or intelligence officers to decide what could be made use of and what might just need to be filed away - tasks all done with pencil and paper. The problem was how to find the many people with the appropriate skills without at the same time revealing what they were to be recruited to do.

The people who might be suitable could include those who were good at solving puzzles such as conundrums and crosswords, so newspaper editors were asked to run a competition. Some of those who responded ‘might be a bit strange’, but it was their skills that mattered. The questions were set, the sub-editors signed the Official Secrets Act, and thousands took part. Most of them were women. Those ‘of interest’ would be asked if they would like to ‘work for the Government’. Many said ‘certainly not’, but others were asked to sign the Official Secrets Act before being further interviewed. - and also asked if they had friends or relations with similar skills who could be approached.

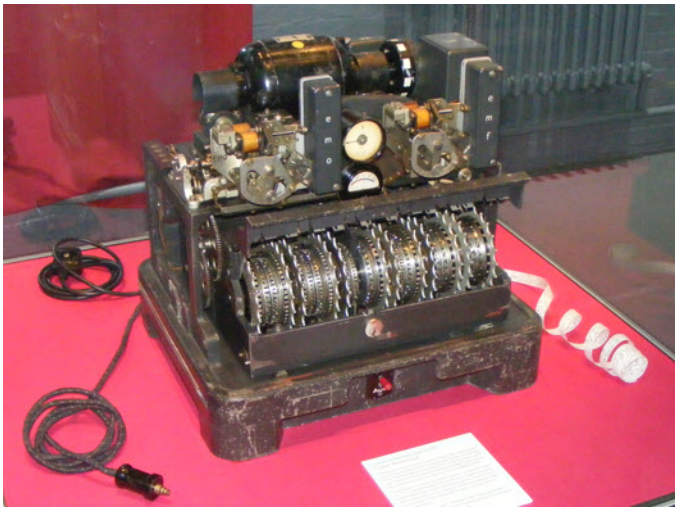
The next task was to find people to translate the received messages into English. Hugh Sinclair’s idea was to ask lots of ‘well-to-do’ families where the daughters had been educated at a ‘Finishing School’ - in Switzerland, and therefore fluent in German, Italian and French. When some arrived at Bletchley Park they came in their own cars, ‘dressed to the nines’ and wearing stiletto heels. The teams at Bletchley Park were a very eclectic mix!

The other part of the process was to receive the radio signals - a process known as wireless intercept - and if WI said quickly it sounded like ‘why’, so they were known as Y stations. Great Britain had such stations around its borders, and with direction finding equipment. The operators would be told the frequency to monitor - if they said all they heard was gobbledegook that confirmed they were on the right frequency. There were not sufficient telephone lines to get the received messages back to Bletchley, so motor-cyclists were recruited - about 140 men and women - to do that. They were taught how to defend themselves, including using fire arms or knives and unarmed combat. They only had small maps to help as they zig-zagged across country - in the wartime blackout conditions, (so no headlights for fear of being spotted from the air) and all road and railway signs removed in case that could have helped an enemy, they navigated by looking for lakes, distinctive trees or bends in the road. It was a difficult task, worked in 8-hour shifts round the clock in all weathers.

Once the vital intercepted information arrived at Bletchley Park it had first to be decoded. This was done with the help of a device known as the Bombe - developed from the Bomba invented by the Polish intelligence teams. It looked for paths in the message so as to eliminate duplicate letters - the advantage of the version at Bletchley being that it worked faster than the Polish design. They were operated by WRNS (women in the Royal Navy) and maintained by technicians from the Royal Air Force and the GPO.

To house the various teams working at Bletchley Park, Hubert Faulkner built 25 huts - all to the same basic system, though of different sizes. From the entrance there was a central corridor, with offices spurred to the left and right, and to maintain secrecy the staff were not to mention their work even in the corridor of their hut. The arrangement of the huts on the site might appear illogical. To minimise the risk of them being bombed, they were kept low and neutrally coloured, to look like farm buildings. The Royal Astronomical Society had worked out where the main trees would cast shadows at different phases of the moon, to help in placing the huts - not a foolproof scheme, but it reduced the risk of them being seen by enemy aircraft.

The huts were all connected by telephone and teleprinter, making it the first ‘intelligence centre’. The ‘engine room’ of Bletchley Park was Huts 4 and 8. Hut 8 included the office of Alan Turing, who had the foresight to use what we would now call computing to solve the complex decoding algorithms. He also had a ‘fatal secret’, and the women there would tease him, maybe by moving his favourite pencil, or turning his office round. When someone decided to steal his coffee mug he decided to respond - by getting a new one and using a padlock and chain to secure it to the radiator! In Hut 6, mathematician Gordon Welchman led the team decrypting German messages, and analysing where the signals were passing to and from.



In 1941 some of the wireless intercept stations reported that what they were hearing was not in Morse code, but teleprinter messages. Three receiving stations were set up - one at Dollis Hill in north-west London and two in Kent - with direction finding apparatus and teleprinters, and the signals recorded on teleprinter paper tape to be shared with the Poles and French. This was the network of German High Command. Three teams were set up to recover these messages. The 5-unit teleprinter signals were decoded by John Tiltman's group, before Bill Tutte's group carried out the crypto analysis, whilst Max Newman led a further team of mathematicians. Max was able to confirm Bill Tutte's conclusion that the teleprinter messages were encoded using a 12-rotor encryption device called Lorenz (*above*) (although the code known at Bletchley as Tunny). With the process they had at the time, it would take too long to decode the messages from German High Command to the Generals in the field to be useful. However, at the GPO research station at Dollis Hill there was a switched teleprinter system, and Tommy Flowers started to modify an existing exchange to try and solve the problem. It was a strange and unreliable machine that Tommy Flowers called "Heath Robinson" - but it proved the concept was possible. The GPO was then commissioned to design, build and install the world's first programmable computer - to be able to decode the Lorenz signal within 24 hours. It was so large it could not go into one of the Huts, so new blocks were built. Not surprisingly, it was called Colossus.

This was before the age of the transistor, and the first Colossus used 1500 thermionic valves. The WRENS who operated it worked wearing blouses and no jacket, as it was a 'rather hot' area to be in. The later version used 2,500 of the thermionic valves, and could process the signals about a third faster than the original. Eventually there were 10 of the Colossus computers. As changes in temperature were the greatest source of unreliability, they were left to run continuously.

By the end of 1942, Poland, France and the United Kingdom were joined by the United States and Canada, and the work done at Bletchley Park enabled their intelligence teams to see Hitler's communications to his generals in the field on a daily basis. The information it provided was vital in planning for D-Day, and President Eisenhower concluded that the work of Bletchley Park probably shortened the war by 2 years, whilst Winston Churchill said that Station X, as Bletchley Park was known officially, was "the geese that laid the golden eggs and never cackled". He also commanded that the Colossus computers etc be dismantled and smashed after the war. Although all dismantled, some units were put into stores. GCHQ (successors to the Government Code and Cypher School) were becoming concerned that Russians had been collecting European Enigma devices, so the Bombes might have been of use to them.

Subsequently, the Bletchley Park Trust - https://www.bletchleypark.org.uk - has restored the house and surviving Huts, with a rebuilt Bombe (*part seen above*) and a replica of the Colossus computer on display in the neighbouring National Museum of Computing - https://www.tnmoc.org/ .

For more information about the society, visit our website at https://www.wargravehistory.org.uk