

Verkaufte Auflage:

Ressort:

Farbe:

Schwarz-weiß: x

Computer

that won the war

So secret was the power of Colossus that Winston Churchill ordered the intricate codebreaker to be destroyed after the war. Now, after years of devotion, one man has finally restored it

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 by
**Julie
Carpenter**

DEEP inside Block H of Bletchley Park, the government's secret Second World War code-cracking centre, a giant machine whirs noisily into action. Streams of tape are spooled at one end while bulbs and tubes flash on and off. The contraption, which resembles an old telephone exchange, emits a discernible heat and weighs more than a ton.

This is Colossus, which some claim to be the world's first computer and which was way ahead of its time. Playing a crucial role in the outcome of the war, it allowed the allies to effectively "read Hitler's mind" and, incredibly, shortened the carnage by as much as two years.

Thanks largely to historians and *Enigma*, Mick Jagger's 2001 film starring Kate Winslet and Dougray Scott, Bletchley Park in Buckinghamshire has become common knowledge. Here, in the early Forties, teams of mathematicians, students, professors, crossword fanatics and chess champions contributed tirelessly

'It shortened the war by about two years'

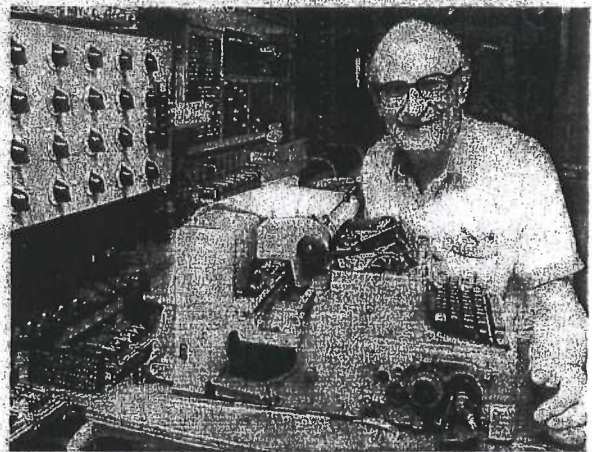
to the war effort by toiling away on vital, highly complicated code-breaking operations.

But whereas the film dealt with the cracking of the German Enigma code, which was used for tactical instructions such as the U-boat directives, there was another, even more elaborate, cipher being unravelled at the same time. This was the Lorenz code, which was used to scramble messages from Hitler to his high command. And Colossus was the machine that deciphered it. It was, quite possibly, Britain's greatest technological achievement that century.

Which makes Winston Churchill's decision, post-war, all the more infuriating. He ordered all but one of the 10 Colossi to be smashed into pieces "no bigger than the human hand" and directed the engineers to consign all their notes and designs into a furnace. The surviving machine was taken to GCHQ, the government's communication base near Cheltenham, and was used against the Soviet Union in the Sixties. But it was later destroyed, too.

This was all down to the government's obsession with secrecy - which even saw the existence of Bletchley kept quiet until the mid-Seventies. Information about Colossus remained classified until 2000.

"There was a very important reason why Colossus was



LABOUR OF LOVE: Tony Sale and his reconstructed Colossus machine

destroyed," says Tony Sale, 76, a former MI5 spycatcher. "The Lorenz cipher is many times more powerful than Enigma. We told the Russians we could break Enigma; we never told them we could break Lorenz. With the Cold War coming up, we didn't want them to find out we had such capabilities."

TONY, who followed up his spycatching days by setting up one of the UK's first computer companies, has spent 13 long years rebuilding Colossus at Bletchley, heading up a small team. It is only now on the cusp of being fully completed and it will be the jewel in the crown of a new National Museum of Computing, to be opened next year. Already visitors to the museum at Bletchley Park can marvel at it.

Still fired up with enthusiasm for the project, Tony is eager to emphasise Colossus's importance.

"Before Colossus, it would take the best code-crackers at Bletchley six to eight weeks to work out

each individual Lorenz message, but Colossus took just six hours, he explains.

Fully operational on June 1 1944, Colossus came into existence just in time to reassure the Allies that Hitler had swallowed their strategic misinformator which tricked the Germans into thinking they would attack across the Pas de Calais rather than on the Normandy beaches. Germany was thus unprepared for D-Day, convincing the Allies to go ahead.

"Colossus's importance was immense," says Tony. "Year later I met a distinguished German historian called Han Meckel who was a former flight officer of Admiral Donitz, the commander of the German navy during the war. He told me, 'I am forever indebted to Bletchley Park. It shortened the war by two years and it probably meant the atom bomb was dropped on Hiroshima and not Berlin.'"

The Germans transmitted their radio messages via teleprinter, with holes for each character punched on to paper tape, but the texts were first encrypted by the Lorenz machine

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The contraption consisted of a number of cipher wheels which were aligned to a different setting each day, which meant that there could be millions of different solutions to the code. Not unreasonably, the Germans were convinced it was unbreakable.

The code-crackers at Bletchley needed a machine that could discover the start wheel positions used on the Lorenz machines, which would allow them to decipher the messages – and quickly.

A rudimentary machine, affectionately nicknamed the Heath Robinson, was first produced, based on some of the ideas of Alan Turing, the mathematician largely behind the cracking of the Enigma code. However, the device was slow and unreliable, which is when Max Newman, the head of Bletchley's deciphering unit, called in electronics expert Tommy Flowers.

Flowers suggested a number of major changes and insisted he needed a year to design and build

the first Colossus. Churchill said that was too long – Britain would by then be under Nazi occupation.

So just 10 months later, on December 8, 1943, Flowers unveiled Colossus Mark 1, which could read the paper tape at an average of 5,000 characters per second. Flowers then upgraded his undertaking and produced Colossus II in time for D-Day. The eventual 10 working Colossi at Bletchley were all built on this model.

This is also the version that Tony Sale has reconstructed, a mammoth task given the scant information available – Flowers had followed Churchill's instructions and destroyed all evidence of his work. When he died in 1998, he was embittered by the lack of recognition he received in his lifetime.

"The rebuild was done from eight black and white photographs and 10 fragments of circuit diagram," says Tony. "I got the fragments – which had been kept illegally – in the Nineties. I went round some of

the engineers who'd worked on Colossus and asked all of them, 'Got any bits of Colossus left?' And some of them had.

"The other bit of good news was that Flowers had used standard telephone exchange gear in the design because that was what was available then – and luckily for us, BT has been decommissioning old telephone exchanges so there's lots of scrap around."

STILL, it was a painstaking process. "I had to piece it all together and slowly work out how each part worked. It's been a long, long job and a labour of love. I started the project in 1993 and about 20 people have worked on it and three of those have died. But now it's a working machine and in the past few months I've used Colossus to break a real cipher."

With just a few more details to

iron out, Tony is hoping it will be officially complete by November 15, when he has organised The Cipher Challenge. Having arranged for the Heinz Nixdorf Computer Museum in Germany to transmit by radio some secret messages enciphered on a Lorenz machine, he has challenged anyone to decipher the messages using all modern technology before he manages it using the rebuilt Colossus computer.

This will be followed by an event on November 28, aimed at raising funds for the National Museum Of Computing at Bletchley Park. According to fundraising adviser Ron Holland, who hopes to collect at least £7million, the museum aims to show the development of computing from the pioneering wartime efforts to the present day.

While America claims (erroneously, some say) that the world's first computer was its own Eniac, which became operational in 1946, Tony is adamant the accolade falls to Colossus – built a full three years

before. Its lineage in computer history is complicated, however.

"It's not in a straight line because Colossus is not a stored-programme computer – it was created purely to perform the task of breaking the Lorenz cipher," says Sale. "The legacy was that the people who worked on Colossus here at Bletchley went out into the world after the war armed with all the knowledge they'd gained from working here."

"For instance, Max Newman became head of mathematics at Manchester University after the war and developed the Manchester Mark 1 – the first stored-programme computer."

Visitors to the site, however, will no doubt be most impressed by Colossus's huge role in defeating the Nazis – a triumph that for too long has remained hidden.

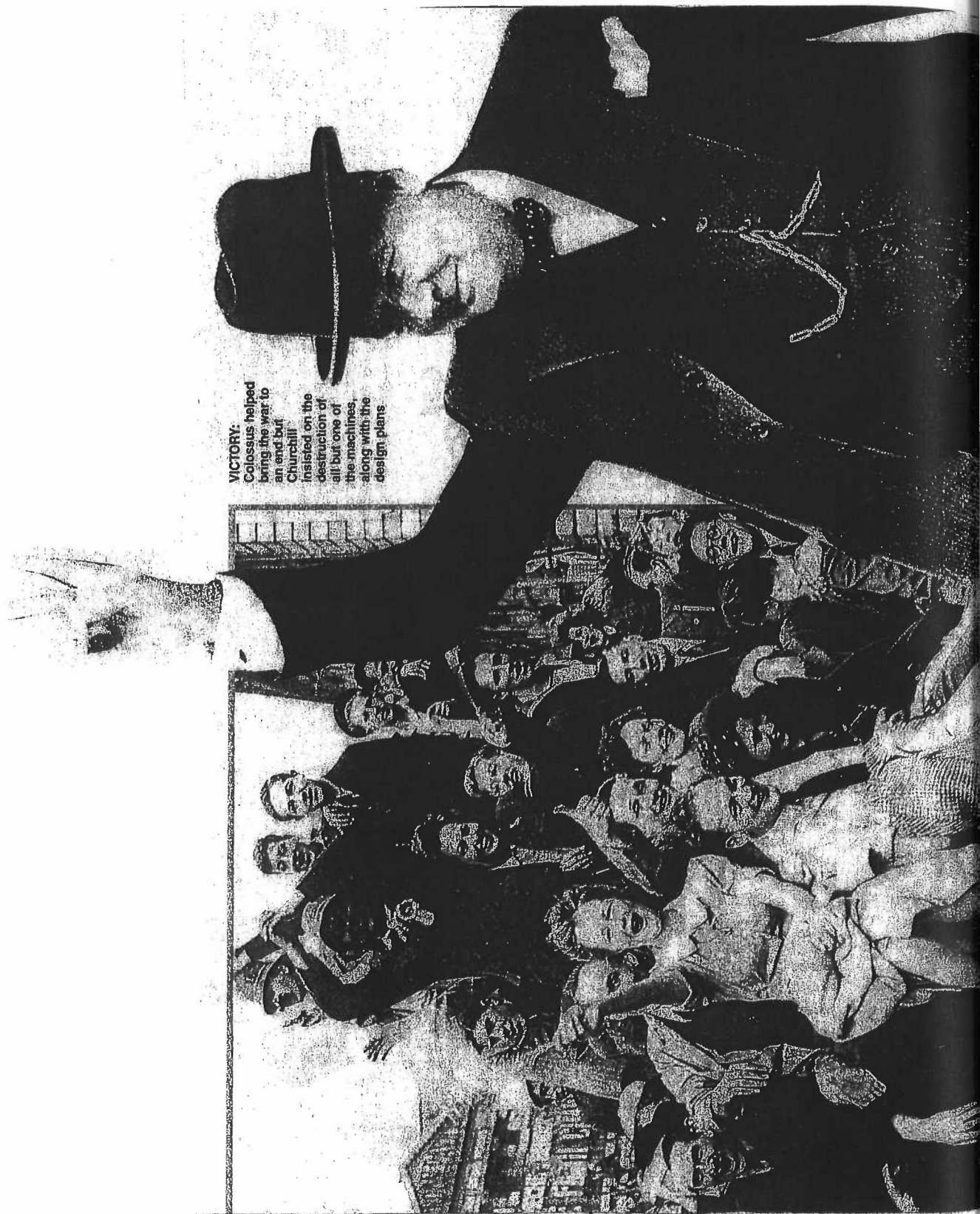
● National Museum of Computing: www.tnmc.co.uk; Tony Sale: www.codesandciphers.org.uk

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VICTORY:
Colossus helped
bring the war to
an end but
Churchill
insisted on the
destruction of
all but one of
the machines,
along with the
design plans